DOCUMENT RESUME

ED 294 632 JC 880 244

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TITLE A Cost-Effectiveness Study of the Two-Year Dental Hygiene Program at Fayetteville Technical Institute.
PUB DATE Aug 87
NOTE 132p.; Ed.D. Dissertation, Nova University.
PUB TYPE Dissertations/Theses - Doctoral Dissertations (041) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS *Allied Health Occupations Education; College Graduates; Community Colleges; *Cost Effectiveness; *Dental Hygienists; Employer Attitudes; *Employment Opportunities; *Employment Patterns; *Program Costs; Program Evaluation; Questionnaires; Surveys; Two Year Colleges; Two Year College Students; Vocational Followup
IDENTIFIERS *Fayetteville Technical Institute NC

ABSTRACT

A study was conducted at North Carolina's Fayetteville Technical Institute (FTI) to determine the cost-effectiveness of the college's 2-year Dental Hygiene Program and to assess the employment opportunities for graduates of this program. The study involved collecting information on the dollar costs of the program and conducting surveys of dentists in the local area, graduates of the program, and currently enrolled students to determine employment opportunities. Study findings included the following: (1) from 1982 to 1986, 172 students enrolled in and 78 students graduated from the Dental Hygiene Program; (2) over the past 5 years, the cost of the program rose, while enrollments declined, with the program never generating enough income to cover costs; and (3) while employment prospects for program graduates were good, 70% of the graduates of the program were employed outside of the FTI service area. Based on study findings, it was recommended that the administration place the Dental Hygiene Program on a 10-month schedule, eliminating the summer program; consider the feasibility of replacing full-time faculty with part-time faculty on an attrition basis; and make no effort to expand student recruitment efforts. The survey instruments are appended. (Author/EJV)

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A COST-EFFECTIVENESS STUDY OF THE TWO-YEAR DENTAL HYGIENE PROGRAM AT FAYETTEVILLE TECHNICAL INSTITUTE

by

Robert Kugelmann

A Major Applied Research Project presented in partial fulfillment of the requirements for the degree of Doctor of Education

Nova University

August, 1987

JC 880 244

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ACKNOWLEDGEMENTS

Completion of this Major Applied Research Project would not have been possible without the support and efforts of many individuals. I especially appreciate the encouragement, and assistance provided by my cluster coordinator and research assistant, Dr. Linwood Powell, the advice and assistance from my major advisor, Dr. Ronald Newell, as well as my staff reader, Dr. Philip DeTurk. I express my sincere appreciation to the fine individuals at Fayetteville Technical Institute who assisted in this endeavor, Bob Timbers, Chairman of the Dental Hygiene Department, and Kathy Barkly who cooperated in the collection of data from currently enrolled students and graduates of the Dental Hygiene Program, Dr. Larry Norris, Vice President for Academic Affairs, Gerald Fulgham, Associate Dean of Curriculum Instruction, and J. B. Simpson, Director Curriculum Data Management who assisted in the collection of financial information as well as providing encouragement and moral support.

Many thanks to Dr. Edward Jackson, Dr. Joe Ward, and Dr. Ken Digby for their assistance, support, and guidance. A special thank you to my wife, Helene who has supported me in this endeavor. Finally, I would like to express my appreciation to the lady who typed this study, Mrs. Eleanor Jackson.

Abstract of a Major Applied Research Project Presented
to Nova University in Partial Fulfillment of the
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A COST-EFFECTIVENESS STUDY OF THE TWO-YEAR DENTAL HYGIENE PROGRAM AT FAYETTEVILLE TECHNICAL INSTITUTE

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August, 1987

The purpose of this Major Applied Research Project was to determine the cost-effectiveness of the two-year Dental Hygiene Program at Fayetteville Technical Institute and to assess the employment opportunities for graduates of this program. Pressures have been mounting at the national, state, and institutional levels for administrators to justify their budget requests, particularly requests for health profession educational programs. This study of the cost-effectiveness of the Dental Hygiene Program addressed questions about program operations in quantitative terms using cost analysis. A cost-effectiveness study was conducted using data compiled on the operation of the Dental Hygiene Program for the years 1982 to 1986. The study focused specifically on the flow and patterns of resource consumption and the services required by the program. This

entailed a review of the costs of the program, and an investigation of possible alternatives to providing these services at Fayetteville Technical Institute.

The methodology employed four major steps: Step one was the compilation of dollar inputs depicting them in a flow diagram (cost construction model). Step two consisted of the needs assessment which utilized the surveys of dentists in the local area, graduates of the Dental Hygiene Program, and students who are currently enrolled in the program. Step three utilized the cost-effectiveness analysis that considered all compiled data to draw conclusions and make recommendations to the administration about the costs and effects of the program. Step four detailed the conclusions about the dollar inputs, results of the program, and the requirements for the continuation of the program.

From 1982 to 1986, a total of one hundred seventy two students, or an average of thirty-four students per year, have been enrolled in the Dental Hygiene Program. A total of seventy-eight students graduated during this period. The average number of faculty was 4.4. The results of this study will assist administrators in their decision making process by allowing them to examine and manipulate the relationships between the program elements of student enrollment, faculty involvement, class size, and basic program structure to obtain optimal educational experiences from available resources.

Employment opportunities for graduates of the program were studied by surveying all sixty-two prospective employers in Cumberland County, the primary area served by Fayetteville Technical Institute, and seventy-eight students who graduated during the past five years. Eighteen students who are currently enrolled in the Dental Hygiene Program were also surveyed to determine what factors influenced their enrollment decisions. The in-depth approach of this study, involving both the actual costs and outcomes of the program, provided the information necessary for assessing program performance and management. Additionally, this study developed a model for administrators of this institution, as well as others, to use in future program and budget planning.

The results of the study indicated that the Dental Hygiene Department meets, or exceeds, the requirements of the American Dental Association and the North Carolina Community College System. The revenues generated by the Dental Hygiene Department have never covered the costs of the program. The cost of the Dental Hygiene Program has risen over the past five years while enrollment has declined. The major portion of the program cost is faculty salaries. Rising costs for the department and the decline in the FTEs generated have created a situation that concerns the department chairman and the school administration. Although employment opportunities for dental hygienists in general are good, seventy percent of the graduates of

Fayetteville Technical Institute are employed outside of the local service area. This situation, and the American Dental Association's guidelines for student/teacher ratio of seven to one, makes it difficult to justify extensive recruiting efforts to increase student enrollment as a means to improve the financial picture for the department.

In an effort to improve the cost-effectiveness of the Dental Hygiene Program, it was recommended that the administration place the Dental Hygiene Department on a ten month program, eliminating the Summer Quarter. It was further recommended that the administration consider the feasibility of replacing, through attrition, part of the faculty with adjunct faculty. The Dental Hygiene Department should continue recruiting efforts at its current level. There should be further studies conducted in the following areas: Appropriateness of the American Dental Association student/teacher ratio, reasons for declining enrollments in this institute's Dental Hygiene Program while other institutes in this state have had an increasing share of the total enrollment, and investigating the possibility of offsetting the cost of the program by crediting the Dental Hygiene Department with funds received for services rendered.

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Chapter 1

INTRODUCTION

Trying to keep pace with the needs of the adult student population requires current and accurate information concerning the characteristics of these students. According to the Fayetteville Technical Institute's Long-Range Plan, 1984-89, one of the purposes of the institute is to identify the educational needs of student applicants and to assist them in satisfying these needs. Each adult who applies will be admitted to a program appropriate to his or her abilities and interests.

Curricular programs should reflect the changing technical, industrial, and health needs of this community and its surrounding area. Currently, Fayetteville Technical Institute offers fifty-six different curricula, one of which is the two-year Dental Hygiene Program.

This program prepares students to be employed by dentists in private practice, clinics, public health agencies, industry, or educational institutions. Graduates of the program receive an associate degree and are prepared to take patient histories, teach oral hygiene, clean teeth, take X-rays, and apply preventive agents under the supervison of a dentist. Graduates are eligible to take the State Board Clinical Examination administered by the North Carolina Board of Dental Examiners. They are also eligible

to take the National Board Dental Hygiene Examination administered by the National Dental Association's Joint Commission on Dental Examinations. A passing grade on both examinations is required to practice as a Registered Dental Hygienist in this state (Fayetteville Technical Institute Catalog 1986-89).

Fayetteville Technical Institute's Dental Hygiene Program meets, or exceeds, the standards described in "Requirements for an Accredited Program in Dental Hygiene Education," approved by the House of Delegates of the American Dental Association (1983). The Council on Dental Education recognized the importance of educational freedom and encouraged innovation in teaching within the broad concepts described in the "Requirements." Fayetteville Technical Institute graduates have been very successful during the past five years in meeting or exceeding these requirements. Only four graduates failed the State Board Clinical Examination on their first attempt. All, but one, of the graduates were subsequently certified on retests.

Statement of the Problem

Of the fifty-eight community colleges in North Carolina, six offer Dental Hygiene Programs, as does the University of North Carolina at Chapel Hill (North Carolina Department of Community Colleges, 1984-85). Costs of these programs have continued to rise. The costs for the Dental

Hygiene Program at Fayetteville Technical Institute have risen from $160,822 in 1982 to $180,159 in 1986 (See Table 1, Chapter 4). This represents a twelve percent increase in actual costs in the five year period of this study. This occurred in spite of the elimination of one faculty position in 1984.

During this same period, enrollment declined from forty-two students in 1982 to twenty-eight students in 1985. Due to increased recruiting efforts, enrollment increased in 1986 to thirty-nine students (American Dental Association, 1987). Educational costs in general rose seventy percent from 1971 to 1981 and are expected to rise sixty-seven percent during this decade (U.S. Department of Labor, 1987).

A recent analysis appeared in the October/November, 1986 issue of the North Carolina Memorandum a publication of the Third Century Project, which was commissioned by the Z. Smith Reynolds Foundation to help trustees and leaders in higher education identify and respond to issues. This analysis showed that over the last decade, from 1976 to 1985, tuition and fees at private four-year colleges and universities in this state have more than doubled. The average annual cost for tuition and fees in 1976 was $1502. This increased to an average annual cost of $3245 in 1985. At public universities, the increase for average annual costs for tuition and fees was $287, or fifty-seven percent, from $501 in 1976 to $788 in 1985.

Cost accountability is an important issue in the educational environment. The rising costs of programs has become a major challenge for educational administrators who are required to justify programs in economic terms. At the 1986 Nova University Summer Institute, Warren Groff pointed out that rising costs of programs in higher education is a national trend. Not surprisingly, many institutions have shown increased concern about this trend. Despite the importance of this issue, research indicates that no study has yet been conducted to investigate the problem of rising costs in higher education for dental hygienists (Graham, 1983). This study investigated the problem of rising costs in the Dental Hygiene Program at Fayetteville Technical Institute.

Background and Significance

The General Statutes of North Carolina, GS 115-D (1980) outline the purpose and requirements for North Carolina Community Colleges and contain the guidelines for long-range planning. In the Fayetteville Technical Institute Long Range Plan 1984-89, the purpose of the institute is outlined as follows (1984:2):

> The purpose of Fayetteville Technical Institute is to provide a specialized occupational and general education to fulfill the needs of society and to provide to the fullest possible development of the potential of students so that they may attain effective citizenship. To accomplish this purpose, offerings and programs are designed to meet the various interests and

> aptitudes of all prospective students. Curricular programs are designed to produce highly skilled personnel.

The Dental Hygiene Program is such a program. In the Fayetteville Technical Institute Long-Range Plan, 1984-89, job opportunities and placement prospects for graduates of the Dental Hygiene Program were considered to be of medium to high availability. The decline in enrollment for the Dental Hygiene Program occurred while overall enrollment for the institute steadily increased. In 1961, Fayetteville Technical Institute began with fifty-eight students and one curriculum. The 1986 enrollment rose to over seven thousand students and fifty-six curricula. The need for the Dental Hygiene Program was of low priority in the Long-Range Plan. At the time the Long-Range Plan was written there, had been a decrease in enrollment in this curriculum.

The decline in enrollment in the Dental Hygiene Program at Fayetteville Technical Institute reflects recent trends in dental education and the supply of dentists. During the past decade, the number of dentists entering practice in this region increased at a greater rate than the general population. This trend is expected to continue through the 1990s. While there was an increase in the supply of dentists, the demand for dental services declined. This was attributed to the slowing population growth, a generally depressed economy, and reduction in dental disease for some groups (Hebbler, 1984).

This cost-effectiveness study of the Dental Hygiene Program addressed questions about program operations in quantitative terms using a mechanism for producing comparable dollar terms. Cost analysis was used as a tool to assess the cost-effectiveness of the program. Cost analysis refers to those processes and procedures that allow for separation of total program and fiscal expenditures into component parts, so they can be examined and interrelated and perhaps rearranged and integrated into a more efficient manner (Vinter and Kish, 1984).

Weathers (1987), the Dean of the Dental School at Emory University, Atlanta, Georgia, and Solomon (1987), Director of the American Dental Association, Washington, D.C., confirmed that no study investigating cost-effectiveness of Dental Hygiene Programs has been accomplished. This study focused on the cost-effectiveness of the Dental Hygiene Program at Fayetteville Technical Institute.

Smith and Smith (1985) searched for published studies that used cost-effectiveness analysis in educational evaluation for the period 1977 to 1983. Using ERIC, as well as references cited in articles obtained from the ERIC search, several articles and books were found which urged evaluators to use cost-effectiveness analysis. However, very few actual evaluations that used cost-effectiveness analysis to make comparative judgments about program or intervention alternatives were found in the literature.

These researchers also found that some of the articles purporting to deal with educational cost-effectiveness studies had misleading titles, and the articles did not actually deal with cost-effectiveness analysis. They concluded that evaluation of educational programs is a concern to institutes of higher learning, private institutions, and businesses. Swanson (1984) concurred that objective evaluation of training and development programs are neither widely practiced nor accepted.

Parker (1984) reviewed the literature pertaining to summative evaluation in training and development for the period from 1980 to 1983. He concluded that the general consensus of most authors was that summative evaluation of training and development programs was not being conducted effectively at that time. Parker further concluded that more attention needs to be given to the components of summative evaluation. The topic of impact, or summative evaluation, is a concern of many training specialists.

A number of arguments can be made as to why evaluators should use cost analysis methods in their work. Wortman (1983:286) stated that "... in conclusion, knowledge and use of CEA/CBA (Cost-Effectiveness Analysis/Cost-Benefit Analysis) may be essential for the very survival of evaluation research." Nevertheless, the actual use of cost analysis methods has been slow to occur in educational evaluation (Smith and Smith, 1984).

Smith and Smith (1985) conducted a national survey to determine what kind of cost-effectiveness studies had been conducted in the field of education at the state level. They concluded that, although some cost work had been reported in the area of education, it is usually a simpler and more descriptive process rather than the sophisticated, comparative approaches advocated in the literature available on evaluation.

According to the Management Information Systems (MIS) Branch of the North Carolina Department of Community Colleges (NCDCC, 1987), the various curricula programs were separately listed by costs per curriculum department during 1981-82 and 1982-83. However, new computer systems were installed at the community colleges, and the new systems were not programmed to provide this information. NCDCC, however, expects to start collecting and tracking costs separately for the various educational programs in the future. No exact starting date is available.

Research Questions

Although overall enrollment at Fayetteville Technical Institute has steadily increased, the enrollment in the two-year Dental Hygiene Program has declined. The enrollment for the first year of this study, 1982, was forty-two students. By 1985, the enrollment had declined to twenty-eight students. Due to extensive recruitment efforts

by the department chairman, the enrollment in 1986 increased to thirty-nine students. This study investigated effects of that decline by surveying employers and graduates, as well as students currently enrolled in the Dental Hygiene Program. The information collected from these surveys provided an essential part of the cost-effectiveness analysis. The cost-effectiveness analysis evaluated all available related costs of the Dental Hygiene Program as outlined by Gonyea (1978) and recommended by Graham (1983). That procedure is shown in Graham's Model (Figure 1, Chapter 3).

Additionally, this study was designed to provide answers to the following questions:

1. How many students have been or are involved in the Dental Hygiene Program during the past five years?
2. What kinds of services were provided for these students?
3. What faculty and staff were required to provide the necessary training of these students?
4. What supplies, equipment, and funds were expended?
5. What was the average cost per student to complete training?
6. Were each and all of these costs necessary and proper?
7. Could equivalent services be given for less cost?
8. What are the potential employment opportunities?
9. How effective is the program? For example, what is

the passing rate on the State Board Clinical Examination?

Definitions of Terms

Alternatives: The different ways of accomplishing a goal or providing a service. Alternatives can differ by the type of equipment or technology used, by the processes or procedures involved, by the levels of services provided, or by combinations of these.

Break-Even Point (BEP): The number of enrollments at which total revenue (TR) will equal total costs (TC).

Consumer Price Index (CPI): Average of prices of goods and services commonly purchased by families in urban areas. Generally referred to as the "cost of living index," the CPI is published by the Bureau of Labor Statistics of the U.S. Department of Labor (Spencer, 1986).

Cost-Effectiveness Analysis: Any analytic study designed to assist a decision-maker in indentifying a preferred choice among possible alternatives. Usually it consists of an attempt to minimize dollar costs subject to some mission requirement (which may not be measurable in dollar terms) or, conversely, to maximize some physical measure of output subject to budget constraint (Quade, 1969). The term cost-effectivness analysis as defined by Niskanen (1969), is specifically directed to problems in which the output cannot be evaluated in terms of market prices, but where the inputs

can be quantified, and where the inputs are substitutable at exchange relationships developed in the market.

Cost per Graduate: This cost represents the total cost (TC) divided by total student output (graduates).

Cost per Student: The cost derived by dividing total cost (TC) by the number of students currently enrolled.

Costs: Consist of expenditures of money and other resources, such as manpower and facilities needed to carry on a program.

Direct Costs (DC): Costs that can be directly and conveniently associated with a cost object.

Effectiveness: The extent to which a program meets specific goals and objectives. The term also connotes a program's beneficial and detrimental effects on the general public, or on specific parts of that public, called "client groups." (Hatry, et al, 1976).

Explicit Costs: Outlays of an enterprise recorded in its books of account (compare implicit costs).

Fixed Costs (FC): Costs that do not vary with volume.

Full-Time Equivalent (FTE): A means to standardize reporting of how many part-time students equate to one "typical" full-time student.

Implicit Costs: Cost of self-owned or donated resources that are not recorded.

Indirect Cost (IC): Costs that cannot be directly or easily attributed to a cost object. Indirect costs are often called overhead costs or simply overhead.

Return on Investment (ROI): These calculations are usually more formal expressions of cost-benefit analysis. ROI calculations reduce the financial evaluation of alternatives to an annual percentage rate of return (R) calculated in the same way as the rate used by banks or savings associations:

$$\text{Rate of Return (R)} = \frac{\text{Income}}{\text{Value}}$$

R = Rate
I = Income or return in terms of money
V = Value of the investment

Sunk Costs: Costs that have been incurred in the past and cannot be recovered. Sometimes these costs are known as "up-front" costs invested at the beginning of a project in expectation of a return.

Unit Costs or Costs Per Unit: Costs that are affected by both fixed and variable costs. Costs per unit are derived by dividing the total costs of production by the number of units produced.

Variable Costs (VC): Costs that vary directly and proportionately with the volume of activities.

Limitations of the Study

1. This study was limited to the Dental Hygiene Program at Fayetteville Technical Institute.
2. The resulting model provides a starting point for other evaluation processes. The model is intended as a guide to

further study, not as a standard for comparison. It may best be used as a diagnostic tool for a given program.

3. The model is not a normative instrument. That is to say, it is not intended to prescribe what other programs "should" score.

Assumptions of the Study

1. It is assumed that a study of this nature yields an insight into the cost-effectiveness of the Dental Hygiene Program at Fayetteville Technical Institute to assist administrators in their decision making process about this program.

2. It is further assumed that the students, graduates of the program, and dentists surveyed answered the questionnaires honestly.

Chapter 2

REVIEW OF RELATED LITERATURE

The American community college originated during the early years of the twentieth century. Social forces developed which pushed for the establishment of these community colleges. Some of these social forces were the need for workers trained to operate the country's expanding industries, a lengthened period of adolescence, and a desire for social equality. New technologies developed that demanded skilled operators. Mobility of the individual was held in high esteem. People who applied themselves most diligently were believed to advance more rapidly.

The community colleges thrived on the new responsibilities and the principles that free, public secondary education should be offered to a wide range of the population. The 1947 President's Commission on Higher Education articulated the value for the populace to have free access to two years more of study than the secondary schools could provide. The commission concluded that approximately half of the young people in this country could benefit from these formal studies and that the community colleges had an important role to play.

With this demand for these services and the public support for them, funding had not been a problem for community colleges. The number of community colleges, both

private and public grew from eight in 1901 to 1,208 by 1984, and the average number of enrollments rose to approximately four thousand students per community college during the same period. In 1984, the total enrollment was over 4.5 million. Almost ninety-four percent of these enrollments were in public institutes. Overall growth in enrollments for two-year colleges throughout the United States peaked in 1982. Enrollments have remained fairly constant since then (Southern Regional Education Board, 1984). Enrollment in two-year institutions of higher education (excluding two-year branches of universities and other four-year institutions) rose from 2,223,000 in 1970, to 4,526,000 in 1980, and to 4,772,000 by 1982. In 1983, enrollment was down by 49,000 students to 4,723,000. In 1984, it again declined to a total enrollment of 4,536,000 (Statistical Abstract, 1987).

In North Carolina, the system has grown to fifty-eight campuses over the past twenty-five years. When the General Assembly set up the system in 1963, about 50,000 students were enrolled in twenty-four campuses. Enrollment for 1987 neared 700,000 in the state. One in seven adults residing in the state is enrolled at one of the campuses in the community college system (July 12, 1987 Fayetteville Observer).

According to Cohen and Brawer (1982), the revolution in American education where the two-year college played a large role is almost over. The two years of post-secondary

education is now available to virtually every American. Funding issues are raised more frequently and difficult questions such as the following are raised: Are community colleges or any school worth their cost? Do their outcomes justify the public resources they consume? Can they, or should they, be called to account for their outcomes?

Trends in financing community colleges have followed shifts in institutional purpose and mode of organization. Community colleges made small demands on public funds in the early years. As they grew in size and number, their budgets and the competition for larger shares of public resources grew as well. Funding for community colleges shifted from tuition to local taxes and state revenues. The trend has been for states to pay an increasingly larger share of these funds. This accounts for state legislatures requiring a greater accountability for expenditures.

After World War II, community colleges emerged as a major force in higher education. They grew steadily for the next twenty-five years. Support for community colleges during this time was strong, and they enjoyed ample funding from both the local communities and the state. As community colleges moved from this affluence into the more austere 1980s, they appear to have reached a watershed in their development. Funds for community colleges have become more difficult to obtain as federal, state, and local legislatures face priorities in balancing budgets (Vaughan, and others, 1983).

During the earlier years of their existence, community colleges made modest demands on public funds; however, with their growth, they began competing with other public agencies for sizable funds. As long as the public felt that public colleges were contributing to the welfare of the community, the colleges were well supported. But with growing dissatisfaction, inflation, and rapid increases in overall enrollment driving costs ever higher, the colleges' support base was shaken (Cohen and Brawer, 1982).

College leaders, according to Cohen and Brawer (1982), will be forced to face several issues regarding finance in coming years. Some of these issues are: competition from other public agencies for funding, not enough money to operate the enterprise, and allocated funds already earmarked for specific uses which will hamper the leaders' discretion. These issues pose serious challenges to today's community college leaders.

The declining growth rate of enrollments was another force which threatened community colleges (Cohen, and others, 1975). While enrollments were growing, college planners expanded staff, buildings, and campuses without once considering the effects of a reversed enrollment trend. Cohen and others (1975) noted that no contingency plans existed for this event, and many college planners expected the post World War II trend to continue.

After years of relative calm and predictability, some community colleges focused more on yesterday's promises

than today's needs. Some of these promises are programs or services that no longer contribute to the welfare of the society. The community colleges have expanded to allow for enrollment of half of the population that begins a college career. They have developed into large enterprises with budgets exceeding the one hundred million dollar mark. Trends in financing community colleges have followed shifts in institutional purpose and organization.

According to Drucker (1980:41):

> The fundamentals pertain to today's enterprise. But all institutions live and perform in two time periods: that of today and that of tomorrow. Tomorrow is being made today, irrevocably in most cases. Managers, therefore, always have to manage both today - the fundamentals - and tomorrow. In turbulent times, managers cannot assume that tomorrow will be an extension of today. On the contrary, they must manage for change; change alike as an opportunity and a threat.

He further pointed out that an enterprise must be kept lean and muscular, capable of taking strain, but capable also of moving fast and availing itself of opportunity. Organizations, public or private, need to control the assignment of resources, evaluate results, and know the performing and productive resources. These organizations need to, "Feed the opportunities and starve the problems" (Drucker, 1980:42).

He continued by stating that in changing times, an enterprise must be managed to withstand sudden blows and to avail itself of sudden opportunities. This means that the fundamentals have to be managed, and they have to be managed well. Fundamentals tend to be taken for granted and,

therefore, they deteriorate unless they are managed carefully, consistently, conscientiously, and continually. The greatest danger to most enterprises today, business, non-business, and public service institutions alike, may be a hidden deterioration of the fundamentals. Fundamentals do not change; however, the specifics to manage them do change greatly. Managing programs today has to begin by investigating the new demands affecting the fundamentals of survival and success. Drucker (1980) concluded that these are: liquidity, productivity, and the costs of the future.

Organizing to meet these needs and organizing for innovation will offer advantages to those who are prepared to accomplish these goals. During the last thirty years, the concept of "planning" has been highly developed. Planners could assume a continuation of trends within narrow ranges and without sudden sharp shifts. They could assume that tomorrow would be much the same as today with only a different mix. Drucker (1980) proposed that the most probable assumption today is that a unique event will occur which could change the configuration drastically. Since unique events cannot be "planned," they can, however, be foreseen and planners should prepare to take advantage of them. There can be strategies for tomorrow that anticipate areas in which the changes are likely - strategies that enable an organization to take advantage of the unforeseen.

Institutions need to think strategically about what business they are in and what business they should be in,

and what their customers are paying for. The question: "What is value for their customers?" should be emphasized. This question is an important one for not-for-profit institutions whether they are hospitals, universities, trade associations, or Red Cross; or whether they are for profit organizations (Drucker, 1980:61).

The strategic planning concept originated in the military and was borrowed by business and is now being applied by higher education. Unfortunately, too often strategic planning stops with the publication of the document entitled Long-Range or Strategic Plan. To create a plan is relatively easy. The difficuly lies with the actions required by planning, and they should be continuing actions, not actions that are terminated with the distribution of the printed document. Planning is an ongoing process, and it needs to have all concerned involved in the process. Planning requires all-encompassing research that informs planners. Strategic planning requires a tireless pursuit of data on students, the institution, the community, trends, and projections (Osborn, 1986). The present study was designed to assist the administrators at Fayetteville Technical Institute with strategic planning of the Dental Hygiene Program.

Murk and Galbraith (1986) stated that planning successful continuing education programs is a necessity if we are to meet the demands and pursuits of a lifelong learning society, and that choosing, developing, and

designing the most appropriate program plan to ensure success is vitally important. They developed a dynamic Systems Approach Model (SAM) for planning successful programs. Part of this model is the administration and budget development process that among others includes:

1. Formulating a cost-effective budget.
2. Determining direct and indirect costs.
3. Securing and funding source.

This approach is not unlike the one suggested by Graham (1983). Murk and Galbraith (1986) also pointed out the importance of accountability and that administrators want profitable programs.

The review of the literature pointed out that from the inception of the concept of the two-year institution, there was tremendous public support of the idea of having this two-year post-secondary education available to virtually every American. Funds were readily made available from both the local communities and state funds. This made planning for the various academic curricula, and vocational and technical programs relatively easy. Under conditions of growth, administrators can make incremental resource decisions to enrich the core of an agency's activities. As a result of this, basic identities such as "we are a social change agency," or "we are a community-based agency," need not be threatened (Hirschhorn and others, 1983:1).

College planners expected a growth trend to continue, and accountability was not a challenging issue.

When growth rates began to decline during the mid-seventies, concern for accountability increased and Drucker (1980), among others, began to point out that managers of both public and private organizations need to control assignment of resources, and that they must manage to withstand sudden blows. Planners were urged to think strategically and emphasize customer satisfaction. Because of this shift from affluence to a cautious suggestion that we may be heading towards a period of declining demand for the services of the post-secondary education, more publications emerged urging that cost-effectiveness studies be conducted before making commitments for more resources.

Historically, evaluation of education and social programs have been conducted to determine if a program is any good (Anderson and Ball, 1978). However, in the last decade, program evaluation activities have been subjected to extensive studies to determine, develop, and validate the theoretical foundations of the evaluation process. As a result of the work by Cronbach (1963), Sassone and Schaffer (1977), and Stufflebeam (1973), program evaluation is now viewed as having six specific purposes (Anderson and Ball, 1978). These purposes are: (1) to contribute to decisions about program installation, (2) program continuation, expansion or certification, (3) program modification, (4) to rally support for a program, (5) to rally opposition to a program, and (6) to contribute to the basic understanding of basic psychological, social, and other processes.

Overriding these specific purposes are the evaluative focus on psychological, sociological, and economic impacts (Geroy, 1984). Accordingly, cost-benefit analysis is a major method of program evaluation in terms of economic impact.

Cost analysis has long been a factor of American life. Gramlich (1981:1-2) cited a letter written by Benjamin Franklin, in which he demonstrated all the essentials of benefit-cost analysis. When confronted with a difficult decision, he enumerated pros (benefits) and cons (costs), attempted to place a weight (value) on each, and tried to figure out which course of action was most beneficial.

London, 19 September, 1772

Dear Sir,

In the affair of so much importance to you, wherein you ask my advice, I cannot, for want of sufficient premises, advise you what to determine, but if you please I will tell you how. When those difficult cases occur, they are difficult, chiefly because while we have them under consideration, all the reasons pro and con are not present to the mind at the same time; but sometimes one set present themselves, and at other times another, the first being out of sight. Hence the various purposes or inclinations that alternately prevail, and the uncertainty that perplexes us. To get over this, my way is to divide half a sheet of paper by a line into two columns; writing over the one Pro, and over the other Con. Then, during three or four days consideration, I put down under the different heads short hints of the different motives, that at different times occur to me, for or against the measure. When I have thus got them all together in one view, I endeavor to estimate their respective weights; and where I find two, one on each side, that seem equal, I strike them both out. If I find a reason pro equal to some two reasons con, I strike out the three. If I judge some two reasons con, equal to some three reasons pro, I strike out the five; and thus proceeding I find at length where the balance lies; and if, after a day or

> two of further consideration, nothing new that is of importance occurs on either side, I come to a determination accordingly. And, though the weight of reasons cannot be taken with the precision of algebraic quantities, yet when each is thus considered, separately and comparatively, and the whole lies before me, I think I can judge better, and am less liable to make a rash step, and in fact I have found great advantage from this kind of equation, in what may be called moral or prudential algebra.
>
> Wishing sincerely that you may determine for the best, I am ever, my dear friend, yours most affectionately.
>
> B. Franklin

During the 1960s and early 1970s, financial resources for education expanded rapidly. The outlook for the 1980s changed. Shrinking tax bases, public expenditure limitations, school bond and levy failures, and reductions in the level of state and federal aid combined to place tremendous stress on education systems. Educational administrators have struggled to cope with these budgetary restraints. Even in areas where budgetary reductions are not an issue and schools enjoy the support of the community, the public has become increasingly interested in the analysis of education costs because tight economic times have heightened public concern for financial accountability (Cohen and Brawer, 1982).

Gray and Smith (1983) concurred that declining budgets are impacting evaluation activities to a greater extent than new legislation, such as the Education Consolidation and Improvement Act of 1981, and that the number of cost analysis questions asked by educational clients are increasing. Thus, the relationships between

program costs and program effects have become increasingly important. Cost analysis offers a two-way perspective: the look backward at historical information to help determine where we are, how we arrived, and consequently how to improve future planning. The retrospective view can produce powerful and concrete details about the relationships between various program operations.

Cost figures proved the link needed to relate activities and results because as Elkin (1980) stated, the dollar provides one measure which uniformly qualifies the level of effort and resources expended. With costs as a base, we can separate the parts which make up programs.

We need cost analysis data not only to plan ahead but also to make informed judgments about program effectiveness and efficiency. However, "the cost analysis information should not be sought for its own sake, it must be relevant, purposeful, and useful for assessing past performance and management and for future program and budget planning" (Vinter and Kish, 1984:228).

Another question that should be answered, as Vinter and Kish (1984) suggested, is: How does a program go about getting together the necessary information about clients, staff, results, et cetera? Three basic files, staff, client, and fiscal, when combined with cost-centered information, should furnish almost all needed data.

There are several methods of cost analysis. Applied economists have argued that the methods of greatest analytic

usefulness are cost-benefit, cost-effectiveness, and cost-utility analysis. These methods allow for the combination of outcome with costs to find the most effective and efficient program options. Cost-effectiveness analysis is a relatively new development, and it is an out-growth of research programs conducted by the RAND Corporation and other similar organizations in the field of defense research. It can be traced to the early post World War II period. The ultimate origins of the constituent elements of cost-effectiveness analysis can be found primarily in general economic theory under such titles as: production theory, utility theory, and quantitative economics. Other disciplines such as engineering, physics, mathematics, and probability theories have also significantly contributed to cost-effectiveness analysis methodologies (Grosse, 1969).

Graham (1983), Assistant Secretary to the Council on Dental Education of the American Dental Association, maintained that unit cost studies traditionally used by higher education have proven unsatisfactory. He suggested that cost models are more advantageous for administrators because input units of the model can be adjusted and the effects of that adjustment can be measured against cost per student. The product of an educational system is the individual who has acquired a specific set of skills and knowledge which an institution recognizes by conferring a degree or certificate on that individual. The degree is the output of the system; the program is the vehicle for

obtaining the degree. A "Program Cost Model" permits one to examine and manipulate the relationships between these elements. He further stated that in times of budget restriction, this would permit administrators to model various combinations of student enrollment, faculty involvement, class size, and basic program structure to obtain the optimal educational experience from available resources (Graham, 1983). This study will use Graham's Model (Figure 1) to determine the effectiveness of the Dental Hygiene Program.

Little has been done to analyze costs of the Dental Hygiene Program (Graham, 1983). The same holds true for cost-benefit modeling in other areas (Geroy, 1984). Those investment models which have been suggested are the same as those used to address capital improvement investments. They consist of methods to justify training investments by using Return on Investment, Benefit-Cost Ratios, and Payback Period models (Geroy, 1984).

Since then, however, a 1987 search of the literature indicates that some studies have been conducted pertaining to cost-evaluations in adult education programs (Dusewicz, 1987). None of these studies pertain to Dental Hygiene Programs or to job opportunities for dental hygienists, with the exception of Armstrong (1977), who conducted a study of the employment patterns of registered dental hygienists in southern Maryland. This appeared to be the last study published on this topic.

The American Dental Association Council on Dental Education has published guidelines for the qualifications for faculty of a Dental Hygiene curriculum. Faculty costs are an important element in the cost-effectiveness analysis of the Dental Hygiene Department. Qualified faculty are an important aspect of the program. The guidelines found in the "Requirements and Guidelines for Dental Hygiene Education Programs" (Jan, 1983:20) are:

> Dental Hygiene faculty members should have background in, and current knowledge of, dental hygiene and the specific subjects they are teaching. Faculty members' experience should include teaching, or completion of courses in education theory and practice. Individuals who do not have this background should be continuing their education in this area.
>
> Faculty who provide clinical instruction should have recognized competence in dental hygiene procedures and clinical practice experience.
>
> It is expected that the dental hygiene faculty will advance professionally through continuing education courses, conferences, institutes, meetings, and workshops.
>
> The program administrator may be either a dental hygienist or dentist. It is desirable that the administrator have previous experience in dental hygiene education and practice. It is expected that a dentist administrator will have background in education and experience that is directly applicable to dental hygiene education.
>
> The supervising dentist is to comply with state dental practice acts, a licensed dentist must be available for consultation and management of emergencies during clinic sessions when patients are treated. The supervising dentist's appointment may be part-time and should be dependent upon the extent of his other commitments to the program. The responsibility of the supervising dentist may be shared by more than one individual. If the program administrator is a dentist, and acts as the supervising dentist, it is expected that additional faculty will be appointed to compensate for time spent in meeting this commitment.

> The site of the dental hygiene faculty should be adequate to provide appropriate faculty-student ratios in preclinical, clinical, laboratory, and classroom sessions, with reasonable student contact hour assignments.
>
> It is expected that faculty will provide individual instruction during preclinical and clinical practice sessions to assure that students have an opportunity to develop competence in performing clinical procedures, and that patients receive appropriate care.
>
> A faculty-student ratio of one to seven or eight is considered minimal for preclinical and clinical learning sessions. On the basis of experience, a one to five or six ratio is suggested.

The review of literature provided an historical background that demonstrated where community colleges are today, how they developed to this point, and what future direction they may take. It showed how funding for these institutes is provided and how it shifted from predominantly local sources to state funded sources. The review also showed how growth in student enrollment created larger demands for funding sources and how competition for these sources led to greater accountabilty for educational expenditures. Administrators of educational institutes became increasingly aware of the needs for better budgeting processes and more sophisticated planning both for short-term as well as long-term or strategic planning.

Planning is now considered an ongoing process with all concerned being involved in the process. Models have been developed using the systems approach to management. These models include the formulation of cost-effective budgets, determination of direct and indirect costs, and

securing funding sources. According to Murk and Galbraith (1986), this will be a continuing requirement because of the importance of accountability and the desire of administrators who want profitable programs.

Cost analysis has been used at least since the time of Benjamin Franklin, who demonstrated the value of cost-benefit analysis. His technique, popularly known as the "Ben Franklin Technique for Decision Making" allows the decision maker to carefully weigh the pros and cons of all aspects to conclude the optimum.

Cost analysis offers a two-way perspective. It offers a lookback that proves, with detailed cost figures, where funds were expended, what was accomplished, what is being done, and consequently, how to improve future planning. There are several different methods of cost analysis. According to applied economists, the cost-effectiveness analysis is one of the methods which offers the greatest analytic usefulness. Graham (1983) suggested a cost model that was selected to shape this study. It was selected because it allows administrators to examine and manipulate the relationships between program elements. This model also permits administrators to model various combinations of student enrollment, faculty involvement, class size, and basic program structure to obtain optimal educational experiences from available resources.

The outlook for the 1980s as found in the literature review indicated a shrinking tax base, public expenditure limitations, school bond and levy failures, and reductions in the level at which state and federal funding will be provided. This outlook and the declining enrollment in the Dental Hygiene Program at Fayetteville Technical Institute are concerns of both the administration and the American Dental Association.

Chapter 3

PROCEDURES AND METHODOLOGY

Health profession education programs have traditionally been overlooked by institutions of higher learning when they attempted to obtain a unit measure of productivity by calculating a "cost per student." When resources are abundant, this does not pose a problem. This is no longer the case. The cost accountability demands by funding authorities reached higher education during the late 1960s, and became an important issue in the health profession education programs in the 1980s. Pressure now is at all governmental and institutional levels for health profession programs to justify their existence. "Cost per student" is the measure of accountability being requested. To provide this data, it has become a necessity to design new methods of cost analysis, one of which is called program cost construction (Graham, 1983).

The term "constructed cost" was developed by the Comprehensive Manpower Act of 1971, P.L. 92:157, Section 205. This act required the Secretary of the Department of Health, Education, and Welfare (HEW) to conduct a study to determine the national average per-student educational costs for the health professions. The Institute of Medicine conducted this study and presented its results to Congress in 1974.

The procedures used in this study employed four major steps: Step one was the compilation of dollar inputs depicting them in a flow diagram (Cost Construction Model). Step two consisted of the needs assessment which utilized the data collected from surveys of dentists in the local area, surveys of graduates of the Dental Hygiene Program, and surveys of students who are currently enrolled in the program. Step three utilized the cost-effectiveness analysis that considered all compiled data. Step four detailed the conclusions about the dollar inputs, the results of the program, and the requirements for the continuation of the program.

The Program Cost Construction Model for this institution examined the data compiled from statistics available on student enrollment, faculty employment and salaries, class sizes, other costs and basic program structure for the years 1982 through 1986. The resulting model was based on the flow diagram suggested by Graham (1983, Figure 1). Figure 2 depicts the basic input units of the model for a typical or average Dental Hygiene Program. The statistics used were obtained from analysis and compilation of data available at Fayetteville Technical Institute. The collected information for the years 1982 through 1986 was compiled to arrive at the total cost per year of the Dental Hygiene Program.

The flow diagram for the Program Cost Construction Model was designed and recommended by Gonyea (1978) and

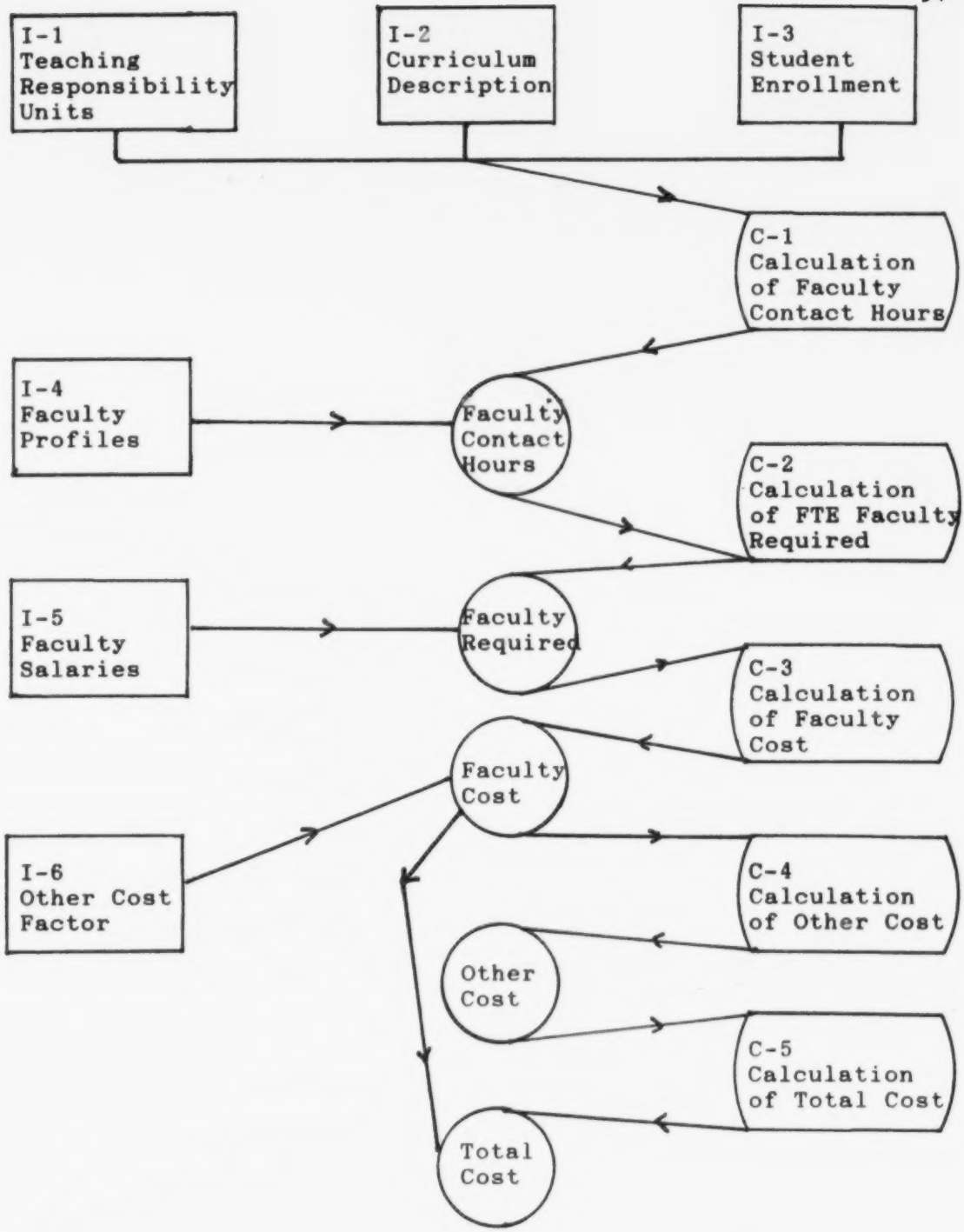

Figure 1

Flow Diagram for the Cost Construction Model
Graham's Model

adapted by Graham (1983). Graham's Model (Figure 1) was utilized for this study. Graham's Model as depicted by the flow diagram shows inputs to the model and includes a description of the curriculum, characteristics of the program (including student enrollment), and a description of the units responsible for teaching the curriculum (I-1, I-2, I-3). Faculty contact hours were obtained by multiplying student contact hours (C-1) by section requirements. The full time equivalent (FTE) faculty requirement of the program was obtained by dividing the faculty contact hours by the availability of faculty for teaching (I-4). Faculty costs were obtained by multiplying FTE faculty requirements by faculty salary (I-5). Other costs were obtained from available records and shown in dollar amounts and percentages (I-6). Total cost was obtained by adding faculty costs to other costs. Cost per student was computed by dividing total cost by enrollment.

In the Fayetteville Technical Institute model, actual dollar amounts (explicit costs) were used. The "Other Cost" factor was not used, because certain indirect costs were not available. No line-item budget was required by the North Carolina Community College System during the period covered. Therefore, no break-out of "Other Costs" was available. Had these figures been tracked, they would have had a negative impact on this study and presented higher total costs for the services rendered.

A. CURRICULUM DESCRIPTION

1. Program Setting — Community College

2. Academic Structure
   a. Term — Quarter
   b. Session Length — 11 weeks
   c. Summer Session — yes
   d. Length of Program — two years
   e. Enrollment
      First Year
      Second Year
      Total number of students
   f. Attrition
   g. Graduates
   h. Scheduled Class Hours/Week

B. FACULTY PROFILE — TEACHING RESPONSIBILITY UNITS (TRU)

	Dental Hygiene	Basic Sciences	General Education
1. Availability for Teaching			
a. Hours Per Week			
b. Average Weeks Per Year			
2. Average Salary			

C. COST FACTORS
1. Faculty Cost
   Percent of Total

2. Other Costs
   Percent of Total

D. STUDENT CONTACT HOURS

Figure 2

Cost Construction for the Fayetteville Technical Institute Dental Hygiene Program
Graham's Model

TEACHING RESPONSIBILITY UNIT (TRU)	DENTAL HYGIENE	BASIC SCIENCE	GENERAL EDUCATION	PROGRAM TOTAL
Student Contact Hours				
Number of Students				
Graduates				
Faculty Contact Hours				
Faculty Available for FTE				
FTE Faculty Required				
Average Faculty Salary				
Faculty Costs				
Other Cost Factor				
Other Costs				
Total Cost FC & OC				

CONSTRUCTION OF STUDENT COSTS FOR TYPICAL DENTAL HYGIENE PROGRAM

1. Total Students
2. Cost Per Student Year
3. Cost Per Student Output

Figure 3

Program Cost Comparison for the Fayetteville Technical Institute Dental Hygiene Program Graham's Model

The models used to compile information for the Dental Hygiene Program at Fayetteville Technical Institute for the years 1982 through 1986 are found in Figures 2 and 3. The compiled information is found in Appendix G, Figures 4 through 13.

The Program Cost Comparison diagram (Figure 3) applied the general characteristics or input units from the Cost Construction Model (Figure 2) to the Program Cost Comparison Model. Figure 2 outlines the academic structure at this institute. It is a two-year program using the quarter system. There are three quarters that are eleven weeks in duration, and two summer sessions equaling eleven weeks in duration. Figure 2 also includes space to provide information concerning student enrollment, graduation, attriton rates, and class schedules. Provisions are also made for faculty data, cost factors, and student contact hours. For this study, the constructed program cost for the Dental Hygiene Program teaching responsibility unit (TRU) was computed. The TRU for Basic Sciences, and the TRU for General Education were not included. The DEMAND element of the model (faculty contact hours) was obtained by multiplying student contact hours as obtained by the program's description of its curriculum by the number of sections required (Appendix E). For each teaching responsibility unit, the average faculty availability for teaching (SUPPLY element of the model) was computed. The full-time equivalent (FTE) faculty requirement was

determined by dividing faculty contact hours by faculty availability for teaching. The need to account for costs other than faculty salaries was provided for by the designation of "Other Cost" factor. This was defined by the relationship of faculty cost to total cost.

State funding for community colleges in North Carolina is based on full-time equivalent (FTE) revenues. Computation of one full-time equivalent (FTE) is based on a student in membership at the institute for sixteen hours of class, shop, or laboratory per week for forty-four weeks. The forty-four weeks represent one full, four-quarter school year. Total membership hours reported for the year, divided by 704, determine the average annual FTE. Student membership hours for a quarter, divided by 176, produce full-time equivalents for a given quarter (North Carolina Department of Community Colleges, 1986).

Appendix A, Table 1, depicts factors influencing Dental Hygiene education costs. It shows the average total costs and the costs by TRU's for the fiscal year 1981 for each region of the United States. These figures were obtained by Graham (1983) by applying the Program Cost Construction Model to the various aspects of the program listed in the table. Excluding the category "Other," programs located in the Northwest have the highest cost per student ($6,435), while those in New England have the lowest ($4,962). These differences can probably be explained by the regional differences in pay scales for faculty. To

compare Fayetteville Technical Institute's costs with these national averages, the Consumer Price Index for 1986 was used to adjust for the effect of inflation since completion of that study.

A survey (Appendix B) was mailed to all dentists identified as being in the area served by Fayetteville Technical Institute. The responses to this survey provided information on job opportunities within this community. Job opportunities are an output of the Dental Hygiene Program.

The graduates of the Dental Hygiene Program during the past five years were also surveyed (Appendix C). The purpose of this survey was to obtain information about the graduates. Available employment opportunities were one aspect of this survey.

Another survey was administered to currently enrolled students (Appendix D). This survey was adapted from instruments used in three previous studies. The three included: A questionnaire used in a North Carolina Community College System (NCCCS) study conducted by Shearon (1980), a questionnaire used in a 1985 study conducted at Fayetteville Technical Institute by Digby, and a portion of a questionnaire used in a study of students enrolled at the University of Wisconsin (Sewell, 1982) to determine their reasons for enrollment at that institute. The survey was validated by a group of twelve instructors at Fayetteville Technical Institute and approved by the Dental Hygiene Department Chairman and the Vice President for Academic

Affairs. Students were instructed to rank no more than five responses to each question. Responses were weighted to indicate their relative importance. The selection indicated as the most important received a weight of five. The selection indicated as least important received a weight of one. This provided the basis to rank order the responses to each question.

The survey submitted to graduates of Fayetteville Technical Institute is one that was distributed by the Fayetteville Technical Institute Alumni Director. The survey instrument is found in Appendix F. The results of this survey compared statistics provided by Health Division graduates with graduates of all curriculums. These results were then compared with the results of the surveys sent to graduates of the Dental Hygiene Program.

The cost-effectiveness of the Dental Hygiene Program was investigated. Enrollment statistics, faculty salaries, cost per student, and cost per graduate were computed using actual costs, and costs adjusted to 1986 dollar values. The dollar amounts were converted to 1986 dollar values by using the Consumer Price Index (CPI) published by the Department of Labor. This was done to provide for easier comparison and interpretation of costs. An analysis was made of faculty costs, total costs, number of graduates, total enrollment, and number of faculty involved. Total average dollar inputs of the Fayetteville Technical Institute Dental Hygiene Program were compared with Graham's Model (1983).

The research questions were answered using the data compiled. Conclusions and recommendations were then drawn from this information.

Chapter 4

PRESENTATION OF RESULTS

The results of this study are presented in this chapter in four sections: Section one addresses the dollar inputs into the Dental Hygiene Program. Section two addresses the needs assessment portion which consists of the results of the surveys submitted to all of the dental offices in the local area, the results of the surveys of the graduates of the Dental Hygiene Program, and the results of the surveys administered to students currently enrolled in the Dental Hygiene Program at Fayetteville Technical Institute. Section three addresses the cost-effectiveness of the program. Section four addresses the questions listed as Research Questions in Chapter 1.

Dollar Inputs Into the Dental Hygiene Program

Table 1 reflects the total dollar inputs for the Dental Hygiene Program at Fayetteville Technical Institute over the past five years, 1982 to 1986. The total explicit dollar amount expended was $829,181. This was an average unadjusted annual expenditure of $165,836. Items included in the cost figures of this program were: faculty and secretarial salaries, contract services, travel, other, supplies, equipment, purchase, and maintenance.

Table 1

Five-Year Dollar Inputs into Dental Hygiene Program at Fayetteville Technical Institute 1982-1986

	1982	1983	1984	1985	1986	Totals	Annual Averages
Faculty Costs	124064	129424	116265	129069	139669	638482	127697
No. of Faculty	5	5	4	4	4	22	4.4
Secretary [1]	5858	9000	7836	7290	8019	38003	7600
Contract Service	0	0	5280	0	0	5280	1056
Travel	1900	1129	1553	5970	812	11364	2273
Other	0	0	0	0	5920	5920	1184
Supplies	17000	16500	16491	16078	18316	84385	16877
Equipment	0	2938	12466	1760	1760	18924	3785
Purchase	12000	0	0	230	0	12230	2446
Maintenance Repair	0	0	3799	5122	5672	14593	2919
Total	160822	158991	163690	165519	180159	829181	165836

1 This figure represents sixty-five percent of secretary's salary. The remaining thirty-five percent is charged to the Dental Assisting Department.

Graham's Model (1983), Figures 2 and 3, Chapter 3, were used to compute the Cost Construction for individual years 1982 to 1986. Appendix G contains Figures 4, 6, 8, 10, and 12 that include the information found in Figure 2 and Figures 5, 7, 9, 11, and 13 that include the construction of student costs for the Dental Hygiene Program as found in Figure 3. The figures obtained from the individual years are listed in actual (explicit) costs per year, and adjusted costs per year to 1986 dollars. This was done to enable comparisons using the 1986 Consumer Price Index Conversion Table (See Table 2). The amounts obtained in the Figures 4 through 13 (Appendix G) were used in compiling the tables discussed in the Dollar Inputs, and Cost-Effectiveness sections of this chapter.

Table 2

Consumer Price Index (CPI) Conversion

School Year	CPI	New Base (1982=100)
1981-1982	6.1	100.0
1982-1983	3.2	103.2
1983-1984	4.3	107.5
1984-1985	3.6	111.1
1985-1986	3.9	115.0

The Consumer Price Index (CPI) in Table 2 as reported by the United States Department of Labor was used to adjust actual dollars to 1986 dollar values. From 1982 to 1986, there was a fifteen percent increase in the Consumer Price Index.

Table 3

Total Explicit Dental Hygiene Program Costs
Adjusted to 1986 Dollar Values

	1982	1983	1984	1985	1986	Total	Average Annual Expenses
Actual Faculty Costs	124064	129424	116265	129069	139669	638482	127697
Adjusted Faculty Costs	143742	145302	125148	134102	139660	687954	137590
Actual Other Costs	36758	29567	47425	36450	40499	190699	38140
Adjusted Other Costs	42588	33195	51048	37871	40499	205201	41040
Actual Total Costs	160822	158991	163690	165519	180159	829181	165836
Adjusted Total Costs	186330	178497	176196	171973	180159	893155	177909

The actual dollar amounts are depicted in Table 3. Faculty costs were obtained from the Dental Hygiene Department's financial reports. Other costs were computed by adding the actual expenditures found in Table 1. These other cost dollar values were also obtained from the financial reports. The total cost is a combination of the faculty costs and other costs. Table 3 reflects both the actual and adjusted costs for faculty costs, other costs, and total costs.

The actual faculty costs rose from $124,064 in 1982 to $139,669 in 1986. There was a reduction of one faculty position in 1984. Adjusted faculty costs show a decrease from $143,742 in 1982 to $139,669 in 1986 because of the faculty reduction. The actual other costs show an increase from $36,758 in 1982 to $40,499 in 1986. When adjusted using the 1986 CPI to determine the adjusted other costs, there was a reduction from $42,588 in 1982 to $40,499 in 1986. Likewise, the actual total costs were reduced when adjusted to the 1986 index. The actual total costs for the five year period were $829,181, and the adjusted total costs were $893,155. The actual average total costs per year for the Dental Hygiene Program for 1982 to 1986 were 165,836, and the adjusted average total costs were $177,909.

Needs Assessment Results

The results of the surveys submitted to sixty-two local dentists are seen in Tables 4 and 5. Of the sixty-two dentists surveyed, thirty-five responded for a return rate of 56.4 percent. According to Isaac and Michael (1981), a sample size of 53.6 percent is needed to allow for reliable inferences about the portion of individuals in the population of a known size who would be responding in a designated manner. Best (1981) stated that a sample size of thirty or more is to be considered a large sample, and the larger the sample, the smaller the magnitude of sampling error. In mailed questionnaire studies, the percentage of responses may be as low as twenty to thirty percent, requiring a larger initial sample mailing. More important than size is the manner in which the sample is selected. For the purpose of this study, the sample consisted of the total population of dentists in Cumberland County, the area served by Fayetteville Technical Institute. Therefore, the return rate of 56.4 percent was considered adequate.

Twenty-five of the respondents employ forty-three dental hygienists, and ten indicated that they did not employ any. Thirty-nine of the employed dental hygienists are full-time employees, and four are part-time employees. Thirty-three, or approximately eighty-five percent, of those currently employed dental hygienists are Fayetteville Technical Institute graduates.

Table 4

Current Employment Picture for Dental Hygienists In Cumberland County (Results of Survey Submitted to All Local Dentists 1987)

	Number	Percent
Dentists Contacted	62	100
Responses	35	56.4
Dentists Employing Dental Hygienists	25	*71.43
Full-Time	39	90.69
Part-Time	4	9.31
Total Hygienists Employed	43	100
Fayetteville Technical Institute Graduates	33	84.62

* Of those dentists responding to the survey, 71.43% employed dental hygienists. The remaining 28.57% had no need for dental hygienists.

Table 5

Future Employment Picture for Dental Hygienists in Cumberland County (Results of Survey Submitted to All Local Dentists 1987)

	Anticipated Growth	Retirement Separation	Possible Needs
Respondents 35			
1987 Short Range Hiring Expectations	6	5	11
Not Expecting to Hire	19	18	0
Undecided About Hiring/ Replacing	2	4	6

In response to the anticipated needs for dental hygienists, twenty-seven dentists expected their needs to remain constant. Two of the respondents indicated that there may be a decrease in their requirements for dental hygienists.

To the question of whether they preferred experienced or inexperienced dental hygienists, fourteen dentists stated that they would prefer hiring experienced dental hygienists. Seven preferred new graduates, and fourteen had no preference.

The respondents felt that the supply of dental hygienists is inadequate, seven dentists felt that there is a sufficient number of dental hygienists available in this area, eighteen stated that there is an insufficient number of dental hygienists available. Ten had no opinion.

As for expanding their operations, twenty-five dentists stated that they would not expand operations even if more dental hygienists were available. Three indicated that they would expand and seven were undecided.

On the questions pertaining to future employment opportunities for dental hygienists in this community, the respondents anticipated six new hirings because of expected expansions of operations due to growth of the market share. Nineteen expected no new hirings in order to expand operations. Two were undecided. To replace retiring or separating dental hygienists, five respondents indicated that they may need to hire replacements to fill those

potential vacancies. Eighteen dentists expected no requirements will exist, and four were undecided. This resulted in a total of eleven potential employment opportunities for dental hygienists for the next graduating class (1987-88).

The results of the survey of graduates of the Dental Hygiene Department at Fayetteville Technical Institute for the years 1982 to 1986 are found in Table 6. Each class is discussed separately. When discussing availablity to work, those who are employed, and those who are seeking employment are included.

In 1982, twenty-two graduated from the Dental Hygiene Program. Of these graduates, eighteen were available for employment. Sixteen of them were employed. Two were unemployed; one for unknown reasons, and one for family-related reasons. Two graduates could not be located. Five dental hygienists responded to the question of starting salary. They reported that their daily wages ranged from $45.00 to $55.00 per day. The average starting salary for these graduates was $12,250. Those reporting wages were all in the local area of Cumberland, Hoke, and Robeson counties. One graduate worked in Saudi Arabia, two were employed in other states, and the others were employed in North Carolina.

In 1983, eighteen students graduated from the program. Fourteen of them were available for work. Eleven were employed. None went to four-year institutes. Two

Table 6

Results of the Survey of Graduates of the Fayetteville Technical Institute Dental Hygiene Program for the Years 1982-1986

	1982	1983[1]	1984[2]	1985[3]	1986	Total
No. of Graduates	22	18	13	13	12	78
No. of Graduates Available to Work	18	14	6	11	11	60
No. of Graduates Known to Be Working	16	11	6	11	11	55
% of Available Graduates Working	89	78	100	85	100	93
No. of Graduates Continuing Education	0	0	0	1	1	2
No. of Graduates Not Working or in School	3	5	3	1	0	12
No. of Employed Graduates Working in Cumberland Co.	6	1	3	3	3	16
% of Employed Graduates Working in Cumberland Co.	37	9	50	27	27	30
No. of Employed Graduates Working Outside Cumberland Co.	10	10	3	8	8	39
% of Employed Graduates Working Outside Cumberland Co.	63	91	50	73	73	70
% of Employed Graduates Working in a Curriculum Related Job	100	100	100	100	100	100
No. of Graduates Unable to Locate	2	2	4	0	0	8
No. of Salaries Reported (Curriculum Related)	5	2	1	7	9	24
Salary Average	12,250	12,500	13,000	13,960	16,727	

1 One graduate did not pass State Board Clinical Examination.
2 Three graduates did not pass State Board Clinical Examination.
3 One graduate is not looking for employment for personal reasons

could not be contacted. One graduate failed the North Carolina State Clinical Board Examination. Two of the dental hygienists responded to the question of starting wages. They reported wages per day. In Lumberton, North Carolina, $45.00 was the daily wage, while the daily wage in Southern Pines, North Carolina, was $55.00. The average annual starting salary was $12,500.

Less than half of the thirteen graduates of 1984 were available to work. Three were not available to work, and four were not located. Three graduates did not initially pass the North Carolina State Board Clinical Examination. Three of the graduates were working in Cumberland County. The only starting salary reported was $13,000.

Of the thirteen 1985 graduates, eleven were available for work. All eleven were employed. One continued her education at a four-year institute. One graduate was unemployed because of family-related reasons. Three worked in the local area, and six were employed outside this county. Two were out-of-state employees. Eight graduates responded to the question of their starting salary. The average starting salary was $13,960 with a high of $21,000 in Virginia, and a low of $9,360 in Lillington, North Carolina.

The 1986 graduates of the program indicated that eleven of the twelve members were available for employment. One graduate went to a four-year institute to continue her

Table 7

Results of the Survey of Graduates of the
Fayetteville Technical Institute
Health Division Program
for the Years 1982-1986

	1982	1983	1984	1985	1986	Total
No. of Graduates	128	120	146	146	152	692
No. of Graduates Available to Work	112	108	110	126	130	586
No. of Graduates Known to Be Working	98	98	96	109	101	502
% of Available Graduates Working	87	91	87	87	78	86
No. of Graduates Continuing Education	3	1	1	5	8	18
No. of Graduates Not Working or in School	24	15	19	22	41	121
No. of Employed Graduates Working in Cumberland Co.	61	65	48	50	63	287
% of Employed Graduates Working in Cumberland Co.	62	66	50	46	62	57
No. of Employed Graduates Working Outside Cumberland Co.	37	33	48	59	38	215
% of Employed Graduates Working Outside Cumberland Co.	38	34	50	54	38	43
% of Employed Graduates Working in a Curriculum Related Job	99	100	99	97	95	98
No. of Graduates Unable to Locate	2	6	29	7	2	46
No. of Salaries Reported (Curriculum Related)	75	52	5	79	81	293
Salary Average	12,600	13,375	14,800	14,242	15,040	

Table 8

Results of the Survey of Graduates of
Fayetteville Technical Institute
for the Years 1982-1986

	1982	1983	1984	1985	1986	Total
No. of Graduates	627	629	646	658	686	3246
No. of Graduates Available to Work	421	403	437	513	500	2274
No. of Graduates Known to Be Working	362	352	385	451	429	1982
% of Available Graduates Working	86	87	88	88	86	87
No. of Graduates Continuing Education	118	146	77	91	121	553
No. of Graduates Not Working or in School	95	72	70	78	103	418
No. of Employed Graduates Working in Cumberland Co.	261	268	270	307	292	1398
% of Employed Graduates Working in Cumberland Co.	72	76	70	68	68	71
No. of Employed Graduates Working Outside Cumberland Co.	101	84	115	144	137	581
% of Employed Graduates Working Outside Cumberland Co.	28	24	30	32	32	29
% of Employed Graduates Working in a Curriculum Related Job	86	81	86	87	86	85
No. of Graduates Unable to Locate	51	66	114	35	33	299
No. of Salaries Reported (Curriculum Related)	205	117	43	320	288	973
Salary Average	12,560	13,478	14,844	13,942	14,736	

Health Division from 1982 to 1986. Table 8 presents the information concerning the graduates of Fayetteville Technical Institute during that same period. It can be seen that ninety-three percent of Dental Hygiene Department graduates who were available to work were employed, while eighty-six percent of Health Division graduates, and eighty-five percent of all graduates were employed. Of those employed, all dental hygienists were in curriculum related jobs, ninety-eight percent of Health Division graduates were in curriculum related jobs, and eighty-five percent of all Fayetteville Technical Institue graduates were thus employed. As for finding employment in Cumberland County, only thirty percent of working dental hygienists were locally employed. The local employment market improved for all Health Division graduates with fifty-seven percent employed in the local area. The figure for all employed graduates of Fayetteville Technical Institute increased to seventy-one percent.

Table 9 compares the starting salaries of the three groups. Average starting salaries are comparable for all three groups. The reported average starting salary for dental hygienists of $13,687 was slightly less than the overall average starting salary of $13,912 for all Fayetteville Technical Institute graduates. The actual average starting salary for Health Division graduates of $14,011 was the highest. Adjusted values show the same differences.

Table 9

Reported Average Earnings Per Year by Dental Hygiene, Health Division and All Graduates of Fayetteville Technical Institute in Actual and CPI Adjusted to 1986 Dollar Values

	1982	1983	1984	1985	1986	Totals	Average Salary Per Graduate
Actual Dental Hygiene	12250	12500	13000	13960	16727	68437	13687
Actual Health Division	12600	13375	14800	14242	15040	70057	14011
Actual FTI Graduates	12560	13478	14844	13942	14736	69560	13912
1986 CPI Dental Hygiene	14193	13975	13975	14504	16727	73373	14674
1986 CPI Health Division	14490	14953	15910	15373	15040	75766	15153
1986 CPI FTI Graduates	14444	15068	15957	14485	14736	74691	14938

Reasons why students enrolled in the Dental Hygiene Program at Fayetteville Technical Institute were also investigated. Eighteen students enrolled in the Dental Hygiene Program for the school year 1986-87 responded to the survey. The survey results are presented in two parts.

Table 10

Demographic Characteristics of Students Enrolled in the Dental Hygiene Curriculum at Fayetteville Technical Institute 1987

Distribution by sex, age, and marital status	Number	Percent
Sex:		
Male	1	5.56
Female	17	94.44
Total	18	100
Age:		
18-21	4	22.22
22-25	4	22.22
26-29	2	11.11
Over 30	8	44.44
Total	18	100
Marital Status:		
Single	5	27.78
Married	12	66.67
Separated/Divorced	1	5.55
Widowed	0	0.0
Total	18	100

The first part (Table 10) is a compilation of the demographic characteristics of the responding students enrolled in the Dental Hygiene Program at Fayetteville

Technical Institute during the Spring Quarter 1987. The second part (Tables 11 through 14) shows the results of the survey concerning the reasons these students gave for attending college, the reasons which triggered their enrollment decisions, the institutional characteristics which influenced that decision, and the reasons for selecting the Dental Hygiene Program.

The demographic factors about students enrolled in the Dental Hygiene Program (Table 10) indicate that female students represented 94.44 percent of the total enrollment. The mean age for the students was 27, and sixty-seven percent of the students were married.

Table 11 reflects the rank-order (R/O) of preferences relating to the factors considered the most important to the students in making decisions to continue their education. Table 12 lists the reasons which triggered their enrollment. Table 13 deals with the institutional characteristics influencing their decision to attend Fayetteville Technical Institute. Table 14 indicates the reasons the students gave for selecting the Dental Hygiene Program. These responses were ranked from 1 to 5 in order of importance, 1 being the most important reason and 5 being the least important reason.

Table 11 reveals that the most important reason for continuing education was to earn more money. The second most important reason was to get a better job and the third reason was to contribute more to society. The least

TABLE 11

Distribution of Students By Rank Order and Weighted Raw Score Reasons for Continuing Education in Dental Hygiene Program at FTI 1987

	N=18 R/O	R/S
Contribute More to Society	3	27
Earn More Money	1	77
Become More Cultured	8	13
Gain a General Education	5	21
Get a Better Job	2	75
Improve Reading/Study Skills	11	0
Improve Social Life	10	2
Learn More Things of Interest	4	23
Meet Interesting People	6	19
Parents/Spouse Wanted Me To Go	7	18
Nothing Better To Do	9	4

R/O=RANK ORDER R/S=WEIGHTED RAW SCORE

TABLE 12

Distribution of Students By Rank Order and Weighted Raw Score Reasons for Enrollment Triggers in Dental Hygiene Program at FTI 1987

	N=18 R/O	R/S
Children Entered School	5	28
Dissatisfied With Job	3	36
Family/Marital Problems	7	16
Received Encouragement	2	50
Financial Aid Became Available	6	17
Lost Job	8	10
Moved To Community	7	16
Obtained Information About FTI	1	66
Serious Illness/Death In Family	9	0
Other	4	32

R/O=RANK ORDER R/S=WEIGHTED RAW SCORE

important reasons were: nothing better to do, improve social life, and improve reading/study skills.

Table 12 shows that the most important reason which triggered enrollment was the fact that these students had an opportunity to learn about Fayetteville Technical Institute. The second most important reason was the encouragement they received from others. The third choice was the dissatisfaction with a current job. The least important reasons were: family or marital problems, being a new resident, lost job, and serious illness or death in family.

The institutional characteristics that influenced the students' decisions to attend Fayetteville Technical Institute are found in Table 13. The most important reason was availability of courses. The second most important reason was location, and the third reason was low cost. The open-door policy of the school, quality of instruction, and job placement service ranked lowest.

Table 14 shows that the reasons for selecting the Dental Hygiene Program were ranked in the following order of preference: (1) secure dental hygiene job, (2) encouragement from a friend, (3) job opportunities in local area, (4) obtain transfer credit, and (5) previously worked in a dentist office. The choices to enhance professionalism or do not intend to get degree were not selected by anyone.

TABLE 13

Distribution of Students By Rank Order and Weighted Raw Score Reasons for Institution Characteristics Influencing Decision to Attend Dental Hygiene Program at FTI 1987

	N=18 R/O	R/S
Courses Available	1	62
Financial Assistance Available	4	23
Job Placement Service	9	12
Location	2	54
Low Cost	3	51
Open-Door Admissions Policy	7	14
Quality of Instruction	8	13
Student-Centered Instruction	6	16
Other	5	17

R/O=RANK ORDER R/S=WEIGHTED RAW SCORE

TABLE 14

Distribution of Students By Rank Order and Weighted Raw Score Reasons for Selecting Dental Hygiene Program at FTI 1987

	N=18 R/O	R/S
Secure Degree in Dental Hygiene	1	72
Obtain Transfer Credits	4	24
Friend Encouragement	2	61
Local Job Opportunities	3	55
Job Oportunities in Other Areas	3	55
Previously Worked in Dentist's Office	5	9
Do Not Intend to Get Degree	6	0
Enhance professionalism	6	0

R/O=RANK ORDER R/S=WEIGHTED RAW SCORE

Cost-Effectiveness of the Dental Hygiene Program

In order to determine the cost-effectiveness of the Dental Hygiene Program, it was necessary to accumulate data pertaining to enrollment, faculty salaries, cost per student, cost per graduate, and FTEs generated. The average adjusted costs of the Dental Hygiene Program at Fayetteville Technical Institute were also compared with the adjusted average costs found by Graham (1983).

Table 15

Student Enrollment in the Dental Hygiene Program at Fayetteville Technical Institute 1982-1986

	1st Year Enrollment	2nd Year Enrollment	Total Students	Graduates [1]
1982	24	18	42	22
1983	20	13	33	18
1984	17	13	30	13
1985	16	12	28	13
1986	31	8	39	12
Totals	108	64	172	78

1. Graduates are based on previous calendar year and will not coincide with second year students.

Table 15 reflects the enrollment in the Dental Hygiene Department from 1982 to 1986. The decline in enrollment can be seen from 1982 to 1985 with an increase in 1986. The number of graduates are based on the previous calendar year and do not coincide with the second year enrollments. These statistics are from the Annual Reports of Dental Auxiliary Education from 1981 through 1987 (American Dental Association).

Table 16

Cost Per Student in Dental Hygiene Program 1982-1986
at Fayetteville Technical Institute
Explicit and 1986 Dollar Values

	1982	1983	1984	1985	1986	Totals	Average[1] Cost Per Student
Explicit Total Costs	160822	158991	163690	165519	180159	829181	4820
Adjusted Total Costs	186330	178497	176196	171973	180159	893155	5193
Enrollment	42	33	30	28	39	172	
Explicit Cost Per Student	3829	4818	5456	5911	4619		
Adjusted Cost Per Student	4436	5409	5873	6142	4619		

1 Determined by dividing total costs by total enrollment.

Table 17

Cost Per Graduate in Dental Hygiene Program 1982-1986
at Fayetteville Technical Institute
in Explicit and 1986 Dollar Values

	1982	1983	1984	1985	1986	Total	Average[1] Cost Per Graduate
Explicit Total Costs	160822	158991	163690	165519	180159	829181	
Adjusted Total Costs	186330	178497	176196	171973	180159	893155	
Graduates	22	18	13	13	12	78	
% of Total Enrolled	52.39	54.55	43.33	46.43	30.77		
Average Explicit Cost Per Graduate	7870	8647	10274	11368	10762		9782
Average Adjusted Cost Per Graduate	9404	9845	11281	12015	10762		10662

1 Determined by adding the average cost per student of the previous year, to the average percentage cost of the graduates for the current year.

For Example: Av. 1981 Cost/Student; $4041
+ % 1982 Cost/Graduate; (52.38x16088/22)=3829
Total Unadjusted Cost/Graduate 7870

The cost per student found in Table 16 was determined by dividing total costs by total enrollment. The Table shows the actual or explicit costs, and the adjusted costs for the Dental Hygiene Program. The average cost per student in actual dollars was $4,820. The adjusted average cost per student was $5,193. The costs per student per year can be compared with both of these figures.

Table 17 shows the cost per graduate or cost per output of the Dental Hygiene Program. Once again the total explicit and adjusted costs are listed. In order to obtain the cost per output, it was necessary to determine the percentage of money that was spent on the graduates. The average cost per student of the previous year was added to the percentage cost per graduate for the current year. The average explicit cost per graduate was $9,782. The average adjusted cost per graduate was $10,662. The average cost per graduate for each year can thus be compared to the acutal and adjusted costs per graduate.

Table 18 compares the average annual salaries for the Dental Hygiene faculty at Fayetteville Technical Institute with the average annual salaries of Dental Hygiene faculty at the seven institutes in North Carolina which teach Dental Hygiene. It can be seen that faculty salaries at Fayetteville Technical Institute are significantly higher.

Table 18

Comparative Average Annual Salaries for Dental Hygiene Faculty 1982-1986

	North Carolina Averages	Fayetteville Technical Institute Averages	Percent Difference
1982	20,635	24,813	20
1983	21,411	25,885	21
1984	22,695	29,066	28
1985	26,450	32,267	32
1986	27,792	34,915	32

Table 19 concerns the Full-Time Equivalents (FTE) generated by the Dental Hygiene Department. The state of North Carolina Community College System provides funds for the schools within the system based on FTEs. The reason for this is that many students attend class on a part-time basis. It is necessary to equate them to "typical" full-time students, and to have a formula to standardize reporting. One full-time equivalent (FTE) is a student in membership for sixteen hours of class, shop, or laboratory per week for forty-four weeks, a full four-quarter year (North Carolina Department of Community Colleges, 1987).

Table 19

Full-Time Equivalents (FTE) for Dental Hygiene Department at Fayetteville Technical Institute During 1982 to 1986

Year	Total Annual FTE's Generated		FTE Factor		Faculty Positions Generated		FTE Salary Per Position		Total Revenues
1982	51.188	/	22	=	2.327	x	25500	=	59332
1983	46.875	/	22	=	2.131	x	25500	=	54332
1984	42.562	/	22	=	1.935	x	26000	=	50310
1985	36.438	/	22	=	1.656	x	26000	=	43056
1986	34.067	/	22	=	1.549	x	26000	=	40261
Total									247291

Table 19 shows the FTE revenues generated for the years 1982 through 1986. Column 2 shows the Annual FTE generated. The FTE is then divided by the FTE factor 22 to determine the faculty positions generated in Column 4. The positions generated are multiplied by an FTE salary per position to determine total revenues. The average Faculty Cost per year in 1986 dollar values was $127,696. In order to obtain this amount, 4.9 faculty positions need to be funded. Table 19 indicates that the positions funded through FTE revenues have steadily declined. Over the past

five years, $247,291 has been generated by FTE revenues. The average FTE revenue generated per year was $49,458.

In 1986, four faculty members were needed to provide the current services for the Dental Hygiene Program at Fayetteville Technical Institute. The actual 1986 faculty costs were $139,660, and the other costs were $40,499 for a total cost for the Dental Hygiene Department of $180,159. This resulted in a deficit of $139,898. To meet total costs, 6.929 faculty positions would need to be funded. To generate this amount, 152.442 FTEs would be needed.

Table 20

Cost Construction Comparisons of Dental Hygiene Programs in 1986 Dollar Values

	Graham 1983 Model	F.T.I. Average Annual Inputs
Total Dollar Input	314,487	177,909
Average Faculty Salary	24,906	31,244
Other Costs	52,475	41,040
Cost Per Student	5,172	5,193
Cost Per Output	10,344	10,662
Class Size	53	34.4

Table 20 compares the Cost Construction of Graham's 1983 Model, adjusted to 1986 dollar values with the Fayetteville Technical Institute Average Annual Inputs. The cost per student and the cost per graduate are similar. The average cost per student is $5,193 at Fayetteville Technical Institute, compared to $5,172 in Graham's Model. The cost per output at Fayetteville Technical Institute at $10,662 was higher. The average faculty salary at Fayetteville Technical Institute was much higher. Total dollar inputs, other costs, and class size were larger in Graham's Model.

Research Questions

The nine specific research questions investigated were as follows:

1. How many students have been, or are involved, in the Dental Hygiene Program during the past five years?
2. What kinds of services were provided for these students?
3. What faculty and staff were required to provide the necessary training of these students?
4. What supplies, equipment, and funds were expended?
5. What was the average cost per student to complete training?
6. Were each and all of these costs necessary and proper?
7. Could equivalent services be given for less cost?

8. What are the potential employment opportunities?

9. How effective is the program, for example, what is the passing rate on the State Board Clinical Examination?

The answers found during the investigation are listed below in order.

1. Table 15 provides detailed numbers of students enrolled by year. The total number enrolled was one hundred seventy-two, with seventy-eight students graduating from the Dental Hygiene Program from 1982 to 1986.

2. The curriculum for the Dental Hygiene Program is found in Appendix E. The total number of Credit Hours of instruction required for graduation in this curriculum is one hundred twenty-four. Of these, eighty-four hours are Dental Hygiene courses, fifteen hours are in general curriculum areas, and twenty-five hours are in related sciences. Of the one hundred twenty-four Credit Hours, ninety-four hours are classroom hours, and ninety hours are spent in clinic hours, which convert to thirty Credit Hours.

3. During 1982 and 1983, the instructions were provided by five faculty members, one of whom is a Doctor of Dental Science. All others are certified dental hygienists. Four faculty members were used from 1984 through 1986.

4. Funds expended for supplies totaled $84,385. Funds expended for equipment totaled $47,924. A detailed accounting of these figures is shown in Table 1.

5. The average costs per student and per graduate are found in Tables 16 and 17. The five-year average cost per student in 1986 dollars was $5172, and $4820 in actual dollars at this institute. The national average determined by Graham was $5,172 (See Table 20). The average cost per graduate at this institute in 1986 dollars was $10,662, and $9,782 in actual dollars. The national average was $10,344 (See Table 20).

6. The costs incurred were necessary and proper based on existing commitments and agreements. However, the average FTE revenues based on 1986 values generated by the Dental Hygiene Department were $49,458 (See Table 19). The differences between total costs in 1986 values of $893,155, and FTE revenues of $247,291, created a deficit of $545,864 over the total period investigated (see Table 19).

7. For the period investigated, these services could not have been provided for less unless contractural agreements were modified.

8. The employment opportunities for graduates of the Dental Hygiene program are excellent (Table 6). The average, reported, unadjusted starting salary over the past five years for dental hygienists was $13,687 (Table 9). This was slightly lower than the average starting salary for other Fayetteville Technical Institute graduates. The average, reported, unadjusted starting salary for graduates of the Health Division during this same period was $14,011. The average, reported, unadjusted starting salary for all

Fayetteville Technical Institute graduates during the past five years was $13,912 (Table 9). Ninety-three percent of all graduates of the Dental Hygiene Program who were available for employment were working. All of these were working in curriculum related jobs. Seventy percent of the employed Dental Hygiene Program graduates were required to find employment outside the local area. One reason for this difference is that there are seven institutes within North Carolina offering Dental Hygiene Programs, and graduates are in demand throughout the state. Seventy-one percent of employed graduates of all curricula at Fayetteville Technical Institute are employed locally, while fifty-seven percent of all working Health Division graduates are employed locally. Eighty-seven percent of the graduates of all curricula available for employment are working, and eighty-five percent of them are in curriculum related jobs. In the Health Division, eighty-six percent of those available to work are employed, and ninety-eight percent are employed in curriculum related jobs (See Tables 6, 7, and 8).

9. The effectiveness of the program as measured by the pass rate on the State Board Clinical Examination is excellent. Only four graduates during the past five years were ever required to retake the State Board Clinical Examination, only one of these did not pass the subsequent examination. The attrition rate over the past five years is 27.8 percent; therefore, over seventy percent of the

students who begin the program graduate. The attrition rate for all seven institutes in North Carolina offering the Dental Hygiene Program over the same time frame was sixty-eight percent. The national average attrition rate was fifty-five percent (Annual Report, Dental Auxiliary Education, 1982-87). The average cost per graduate over the period investigated was $10,662. This is comparable to the national average of $10,344 (See Table 20).

Chapter 5

INTERPRETATION, CONCLUSIONS, AND RECOMMENDATIONS

Interpretation of Results

The purpose of this study was to determine the cost-effectiveness of the Dental Hygiene Program at Fayetteville Technical Institute. It investigated the dollar inputs to the program, surveyed local dentists on employment opportunities for graduates, surveyed graduates to determine employment outcomes, and also surveyed currently enrolled students to ascertain the reasons for selecting the Dental Hygiene Program. It answered questions relating to the inputs and services offered. It looked into possible alternatives for delivering these services. The consumers of this research are the administrators of this institution and perhaps others who may use the model to determine cost-effectiveness of other curriculum programs.

To conduct the cost analysis, Gonyea's Model (1978), recommended by Graham, Assistant Secretary, Council on Dental Education of the American Dental Association, was used to investigate and analyze the inputs of financial resources to the Dental Hygiene Program. According to Graham (1983), this Program Constructed Cost Model allows administrators to evaluate and adjust any input unit, measure, and if necessary, adjust the cost per student. In

times of budget restrictions, it also permits administrators to model various combinations of student enrollment, faculty involvement, class size, and basic program structure to obtain optimal educational experiences from available resources. Graham suggested this model be applied by non-baccalaureate Dental Hygiene Education Programs in the United States.

The financial inputs to the Dental Hygiene Program at Fayetteville Technical Institute for the period from 1982 to 1986 were adjusted to 1986 dollars. The total adjusted input was $893,155, or an average of $177,909 per year. These figures represent the total explicit cost inputs to the Dental Hygiene Program only. They do not include the costs involved for Teaching Responsibility Units - (TRU 2) basic science, and (TRU 3) general education programs offered to dental hygiene students. TRU 2 and TRU 3 costs were not investigated. The Dental Hygiene Department Chairman requested that his department inputs be studied independently. The cost dollars for (TRU 1) dental hygiene were adjusted to 1986 values to allow for better comparisons. The data compiled by the American Dental Association reflects that the average national cost for (TRU 1) dental hygiene, was $248,606, or $314,487 in 1986 dollars (Table 20).

Explicit other costs for the Fayetteville Technical Institute Dental Hygiene Department were $190,699 for the five-year period investigated. In 1986 dollar values, this

represented an investment of $205,201, or an annual investment of $41,040. The sunk cost representing the majority of the initial equipment investment amounted to approximately $83,000. According to the Director of the Property Control and Service Department at Fayetteville Technical Institute, no actual dollar number is available because much of the equipment used in the Dental Hygiene Department is donated by local dentists or other business enterprises. The same also holds true in many instances where supplies, as well, are donated to institutes. Therefore, no analysis was completed in this area. Had these cost figures been available, higher total costs for the department would have resulted. According to the North Carolina Department of Community Colleges, these figures may be easier to identify in the future. Beginning with the 1987-88 fiscal year, the department will start to trace these costs.

The total adjusted average annual cost of the Dental Hygiene Program was $177,909. This was $136,578 less than the comparable costs of $314,487 of the typical Dental Hygiene Program described by Graham (1983). This was in spite of the higher average salary costs for faculty members. This institute offered the educational services in the Dental Hygiene Department with an average of 4.4 faculty members over the five-year period studied. The adjusted average salary per faculty member, in 1986 values was $31,244. Graham reported 6.4 faculty, with an adjusted

average salary of $24,906. In the other cost areas, this institute's explicit costs were $41,040, which is $11,435 lower than the average annual cost of the typical Dental Hygiene Program described by Graham (1983). The average cost per student, $5,193, and the average cost per output (graduate), $10,662 are comparable to the costs in the Graham Model. This is due to the difference in the average class size which was fifty-three in Graham's Model and thirty-four for Fayetteville Technical Institute. This represents a difference of thirty-five percent fewer students per class on average (Table 20).

The average class size in the Dental Hygiene Department has diminished at this institute proportionately to the overall enrollment from 1982 to 1986. Student enrollment in this curriculum has been of concern to the school administration. Until 1985, it had declined from forty-two students in 1982 to twenty-eight in 1985. During 1985, the Dental Hygiene Department initiated an all-out effort to recruit new students for the Dental Hygiene Program. This recruitment effort received support from local dentists. They sent referrals to the Dental Hygiene Department. This is reflected in an increased enrollment of thirty-one new students in 1986, for an overall enrollment of thirty-nine students.

The decline in enrollment was not unique to this institute. On the state and national levels, the decline has also been visible, although, at a lower rate (American

Dental Association, 1986). National statistics still show a declining enrollment; however, this institute, because of recruitment efforts, experienced a reversal in 1986.

Currently enrolled students are part of this reversal in the enrollment trend at Fayetteville Technical Institute. Their answers to the survey questions indicated that they expect to find employment, and that it will be a better job and allow them to earn more money. The number one choice for selecting the Dental Hygiene Department was to secure a degree in dental hygiene. Encouragement from a friend and the local job market were second and third choices respectively, indicating a positive attitude about their expectations. Past performance by graduates available for work tends to support this attitude since ninety-three percent of those available to work are employed. All who are working are employed in a curriculum related field. According to the Department Chairman, the reputation of the program is excellent.

Inputs are relatively easy to compute in dollar values. Most organizations are well aware of the importance of maintaining good records because they have been putting together "service statistics" to describe their operations, to plan changes, and to improve management. Funding or licensing bodies may mandate record keeping, internal or special needs may dictate collection of data, or sometimes records are simply kept because "that's what we always did" (Vinter and Kish, 1984).

Anderson and Karl (1982) reported that they could not generate meaningful comprehensive cost data for virtually any categories of adult education that they studied. They felt that some of the reasons for this were inadequate management information systems, the educator's desire to keep the information secret and a lack of awareness of the concept of full cost and the extent of the resources that were devoted to the program.

Measuring output, on the other hand, is a more difficult task. Service organizations often have difficulties defining and determining valid output measures, partly because of the newness of the idea of breaking down the flow of operations and quantifying elements. Mostly, though, difficulties arise from the intrinsic problem of determining what exactly was produced and achieved by the organization with its inputs. Still, some result measures can be assigned and analyzed. Often a program will have to avail itself of an output measure that approximates or stands in for an objective that cannot be reasonably quantified. The range of currently common product measures include persons who completed training, accepted placements or referrals, graduates, or the number of students who completed a course, et cetera (Vinter and Kish, 1984). The outputs of this study were the number of graduates, their success on the State Board Clinical Examinations, whether they were employed, and who needed their services.

During 1982 to 1986, the Dental Hygiene Department served one hundred seventy-two students (Table 15). Of these, seventy-eight graduated and seventy-seven passed the State Board Clinical Examination. Fifty-five of the graduates were known to be working, and all were employed in curriculum related fields (Table 6). The Fayetteville Technical Institute graduates who are employed full-time in the local area represent eighty-five percent of the total number of full-time dental hygienists utilized by the dentists who responded to the survey (Table 4). On the average, the respondents projected a need for eleven to seventeen new dental hygienists (Table 5). Fayetteville Technical Institute has the capability to meet these projections.

The average attrition rate for the Dental Hygiene Department has been approximately twenty-eight percent. Over the past two years, the rate has been close to twenty-five percent; therefore, with thirty-one new students enrolled in 1986, it is expected that twenty-three of them will graduate, and based on the department's experience at the State Board Clinical Examination, all can be expected to pass and be available for work. The comments made by local dentists indicate their general satisfaction with the outputs, numbers, and quality of the Dental Hygiene Department.

The American Dental Association's Annual Reports show that the total number of graduates from the seven North

Carolina schools offering Dental Hygiene Programs declined from 1981 through 1985. In 1986, there was a small (.3%) increase in the number of graduates from North Carolina schools. Fayetteville Technical Institute's number of graduates has declined since 1982, and the percent of Fayetteville Technical Institute graduates in the Dental Hygiene Program dropped from twenty-one percent of all Dental Hygiene graduates in North Carolina in 1982 to fourteen percent in 1986. Central Piedmont and the University of North Carolina appear to have gained in student enrollment and consequently in the number of graduates (American Dental Association, 1987). The reason for the drop at Fayetteville Technical Institute was not investigated in this study; however, this may be an area of interest for further investigation.

According to Drucker (1980) the 1980s have the characteristics of turbulent times. Managers and employees are facing difficult questions. In the face of declining revenues, which programs must be preserved? How are programs developed under conditions of austerity? What new relationships must an organization develop with its clients, its customers, or its competitors? How are the employees' commitments to the organization and its goals sustained in times of uncertainty? These are difficult questions to answer, yet no administrator can avoid them.

When growing agencies plan, they can afford to make resource allocation errors because they can be corrected

with tomorrow's new resources. However, when agencies plan under conditions of decline, there is little margin for wrong decisions.

Crucial economic, political, and human problems arise. Under conditions of decline, some individuals or interest groups may lose resources. Under conditions of decline, staffs have to make difficult decisions and chose between services, staffs, offices, and functions; at times these decision makers feel they each know the criteria, and have the ability to make such decisions (Hirschhorn and others, 1983).

Trade-offs become more severe, decisions may hurt individuals, and interest groups can lose confidence. Hirschhorn and others (1983) believed that there are two useful approaches under circumstances which are similar to the ones found in the Dental Hygiene Department: First, managers must create organizational designs that maximize program flexibility to allow staff personnel to respond to a range of possible opportunities and threats. Secondly, goal-based planning models that are future-based can assist decision makers to examine where they want to go, and develop plans to help them get there.

As Drucker (1980) pointed out, staffs also must look backwards. They need to examine the organization's strengths and then develop plans through which these strengths can become more effective.

Fayetteville Technical Institute has demonstrated its strengths by its continued ability to retain students and to attract new ones. The growth of Fayetteville Technical Institute from an initial enrollment of fifty-eight students in 1961, to over seven thousand in 1986, and its ranking as the second largest institute in the North Carolina Community College system speaks for itself. The reasons for the declining enrollment in Fayetteville Technical Institute's Dental Hygiene Program are not inconsistent with state and national trends for other Dental Hygiene Programs, but are inconsistent with the overall retension rate of the institute.

During the period of 1982 to 1986, the Dental Hygiene Program had a total enrollment of one hundred seventy-two students, with an average annual cost per student of $4,820, or an average annual adjusted cost of $5,193 (Table 16). Seventy-eight students graduated. The average annual cost per graduate amounted to $9,782, adjusted to $10,662 cost per graduate (Table 17). The actual average annual dollar input was $165,836 and the adjusted average annual dollar input was $177,909 (Table 3). The annual FTE revenues for the Dental Hygiene Program are found in Table 19. A total of $247,291 was listed as income to the institute in the form of FTE revenues over the five-year period. An excess of $581,890 was spent over this five-year period for the Dental Hygiene Department.

One reason for conducting this study was to complete a break-even analysis, a management tool which provides a simple and logical analytical technique for studying the relationship between fixed costs, variable costs, and revenues. This relationship can be charted in order to illustrate and analyze the point at which costs are covered by revenues. This technique has many other applications; for example, the break-even analysis can be used to test alternative marketing strategies or to develop particular contingency plans. It can also be used for problems like: What would happen if fixed costs rise X percent and prices are held constant? What increase in FTEs must be gained to justify an X percent increase in the marketing budget?

Break-even analysis can also be used to determine the effect of a major capital investment on fixed, variable, and total costs. It can measure past performance, measure a minimum dollar profit, or identify the point at which operations should be shut down.

Unlike cash flow studies, break-even graphs make analysis easier. To construct the graph, fixed costs, variable costs per unit, volume of output, and revenues per unit are estimated or established. With this information, fixed costs, variable costs, total costs, units of output, volume, total revenues, break-even point, amount of profit, amount of loss, and maximum profit can be depicted. The break-even point is thus stated in terms of total output, total inputs, or capacity. In a typical break-even chart,

the total revenue line intercepts the total cost line representing the break-even point (Small Business Report, 1986).

The data compiled for Fayetteville Technical Institute's Dental Hygiene Program did not lend themselves to this type of break-even analysis, because the Total Revenue curve is continuing to decline and the Total Variable Cost and the Total Fixed Cost lines are increasing. There is no opportunity for these lines to intersect at a point depicting where total costs would equal total revenues. To generate the required revenues to cover the expenditures for this department, more FTEs would be necessary. This means more students per class. Consequently, more faculty would be required to meet the American Dental Association's certification guidelines that allow for a student/faculty ratio of seven to one.

In addition to these restrictions, another serious consideration is the marketplace. According to the dentists surveyed, there is no need for more dental hygienists than are currently produced. Therefore, because of these considerations, there would be no opportunity for these lines to cross and determine a break-even point. Table 19 shows the FTE revenues generated by the program. The average FTE generated revenues in 1986 values were $49,458. The average annual costs for the program in 1986 values were $177,909; therefore, there was an average deficit of $127,451.

Conclusions

The results of this study lead to the following conclusions:

1. Overall employment opportunities should remain constant and will not generate a higher demand than the current output of the Dental Hygiene Department at Fayetteville Technical Institute (Tables 5 and 15).

2. The revenues generated by the Dental Hygiene Department have never covered the costs of the program (Table 19). This is not unique to this institute. The costs of the Dental Hygiene Program have always been higher than the funds generated by FTEs.

3. The actual costs of the Dental Hygiene Program have risen over the past five-years while enrollment declined until 1986. This resulted in a widening of the gap between revenues generated and total costs, thus increasing the cost per student and cost per graduate. Tables 16 and 17 show the cost per student and cost per graduate. These showed a steady increase from 1982 to 1985. The figures shown for 1986 show the results of the recruiting effort by the Dental Hygiene Department Chairman.

4. The overall average enrollment per year in Fayetteville Technical Institute's Dental Hygiene Department has been 34.4, and the average faculty utilized has been 4.4. This computes to a ratio of 7.8 to 1 which slightly

exceeds the maximum student/faculty ratio of seven to one as recommended by the American Dental Association. With recruitment efforts for the 1986 school year, this ratio became nine to one. This amounts to two more students per faculty than recommended by the American Dental Association in its stated objectives. If recruiting efforts are intensified, and more students enroll in the Dental Hygiene Program, additional faculty will be required; and the existing gap between revenues generated and costs will widen further (Tables 16, 17, and 19).

5. It appears that in adjusted dollars, the total costs for 1982 exceeded the costs for 1986, and the total costs for 1983 approached the costs for 1986 (See Table 3). The reason for this discrepency was the difference in faculty costs. There were five faculty members employed during the first two years of the study. Four faculty members have provided the services since 1984.

6. Fayetteville Technical Institute's Dental Hygiene Program can attract students if a recruiting effort is made by the department. This was demonstrated when the Dental Hygiene Department Chairman initiated an intensified recruiting program aimed at the local high schools. Department personnel also went to the local dentists to seek referrals. Because of this added effort, in 1985-86, the enrollment in the Dental Hygiene Department increased from a low of sixteen first-year students in 1985 to thirty-one first-year students in 1986 (Timbers, 1987).

7. The major cost of Fayetteville Technical Institute's Dental Hygiene Program is faculty salaries (Table 3). The average faculty salary at Fayetteville Technical Institute exceeded the average faculty salary found in Graham's Model (1983) by $6,238 per faculty member per year (Table 20).

Recommendations

To capitalize on this institute's strengths, and to develop a more cost-effective program, the following recommendations are made:

1. The administration should consider the feasibility of operating the Dental Hygiene Department on a ten month basis, or shifting the curriculum requirements, so that non-department required courses are taken during the summer quarter. The requirements for a degree in Dental Hygiene are found in Appendix E. The summer quarter currently consists of two Dental Hygiene curriculum courses, and two other courses: Physiological Nutrition and Oral Communications. The latter two courses are found in the related sciences and general curriculum areas, and costs for these classes were not included in this study. Each of these classes consists of three classroom hours, and can be completed during the summer quarter (or in any of the other six quarters). The two Dental Hygiene courses, DEN 116 Medical-Dental Emergency Care, and DEN 141 Dental Hygiene

IV, consist of two classroom hours, and one classroom hour and six clinic hours per week, respectively. These two courses could be incorporated into any of the other six quarters.

2. When a faculty position is vacated, the administration should consider the feasibility of filling the D.D.S., or other faculty position, with either contractural-consulting, or qualified adjunct faculty who are part of the "professional community." Adjunct faculty are paid an hourly rate of ten to sixteen dollars. They do not receive expensive fringe benefits, such as: paid vacations and holidays, insurance, and allowances for professional development. This could amount to substantial savings without jeopardizing the quality of the program. Fayetteville Technical Institute has been successful in attracting highly qualified adjunct faculty (Jackson, 1986).

3. The most obvious solution to making the program cost-effective would be to increase recruiting efforts to improve the financial picture. However, student/faculty ratios as outlined by the American Dental Association, do not permit additional students per class without increasing the number of faculty employed. The American Dental Association's guidelines (1983), call for a ratio of seven to one. Conducting evening classes may allow the department to generate more FTEs. However, both of these alternatives would require additional faculty since this department's student/faculty ratio for 1986 already exceeded the level

recommended by the American Dental Association by two students.

Another factor to consider is that of local employment opportunities. This study has shown that seventy percent of the employed graduates of the Dental Hygiene Program are working outside of the local area (Table 6). Local dentists anticipate needs that do not exceed the number of graduates (Table 5). This would have a negative effect on the recruiting effort and reduce the number of new students simply by the operation of an economic principle - supply and demand.

4. The administration should also consider having additional studies conducted in the following areas:

a. Appropriateness of the American Dental Association student/faculty ratio.

b. Reasons for declining enrollments in this institute's Dental Hygiene Program while other institutes in this state have had an increasing share of the total enrollment.

c. Further investigation into the possibilities of crediting the Dental Hygiene Department with money received for services rendered, to offset the cost of the program.

Strategies for Diffusion, Implementation, and Improvement

The results of this study can serve as a model to assist administrators to evaluate the feasibility of proposed and/or ongoing curriculum programs. There is little doubt that the current climate of fiscal accountability requirements will persist. The tremendous demands on capital markets make it difficult for administrators to obtain the funds needed to maintain or expand programs.

This study could also be used to assist administrators in their efforts to justify continuation, expansion, reduction, or implementation of new curricular programs. Changes in curricular programs should not be recommended without first obtaining the supportive data which may be collected by conducting a cost-effectiveness study.

Smith and Smith (1985) stated that cost-effectiveness analyses are powerful decision-making tools, but that they are seldom practiced by evaluators. They found that the three major impediments to cost analysis were that evaluators are seldom asked to conduct cost studies, that they are difficult to conduct, and that evaluators have few guidebooks, texts, or examples to follow in conducting cost studies.

This study has compiled much of what has been published in the area of cost-effectiveness and prepared a model which can be used and applied in any curriculum area of this institute, or any other two-year institute. Copies of this Major Applied Reseach Project will be furnished to the Vice President for Academic Affairs, the Dean of Instruction, the Dean of Student Development, and the Chairman of the Dental Hygiene Department. These four levels of institutional leadership may disseminate and use the results of this study as they deem appropriate. They all have expressed an interest in this study. This cost-effectiveness model can also be distributed by the administration to all the Department Chairpersons to be used with other curricula.

The American Dental Asssociation and the Louisiana Department of Education's Bureau of Evaluation, Office of Research and Development, have also shown an interest in the results of this study and have expressed an interest in obtaining a copy. With the approval of the Vice President for Academic Affairs, they both will receive copies of this study.

BIBLIOGRAPHY

American Association of Community and Junior Colleges. Annual Report, 1980. Washington, D.C.: ASCJC, 1980.

American Dental Association. Annual Report on Dental Auxiliary Education, 1981-1982 through 1986-87. Chicago: ADA, 1982 through 1987.

_____. "Requirements and Guidelines for Dental Hygiene Education Programs." Council on Dental Education, January, 1983.

Anderson, R. E., and E. S. Karl. The Cost and Financing of Adult Education and Training. Lexington, Massachusetts: Lexington Books, 1982.

Anderson, S. B., and S. Ball. The Professor and Practice of Program Evaluation. San Francisco: Jossey-Bass, 1978.

Armstrong, David F. The Dental Hygienist: A Study of the Employment Patterns of Registered Dental Hygienists in Southern Maryland, Montgomery College. Rockville, Maryland: Office of Institutional Research, 1977.

Arns, Robert G., and William Poland. "Changing the University Through Program Review." Journal of Higher Education, 51:268-283, 1980.

Best, John W. Research in Education. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1981.

Carr, C., and others. "Cost Benefit Analysis in Educational Evaluation." Studies in Educational Evaluation, 1982.

Cohen, A. M., and F. B. Brawer. The American Community College. San Francisco: Jossey-Bass, 1983.

_____., and others. College Responses to Community Needs. San Francisco: Jossey-Bass, 1975.

Comprehensive Manpower Act of 1971, P.L. 92-157, Section 205. Washington, D.C.: Government Printing Press, 1971.

Cronbach, L. J. "Course Improvement Through Evaluation." Teacher College Record 64:672-683. 1963.

Cross, K.P. "Community Colleges on the Plateau." Journal of Higher Education, 52(2):113-123, 1981.

DeFriese, Gordon, and Ben D. Bacher. "The Status of Dental Manpower Research." The Journal of Dental Education, 47, November, 1983.

Digby, K. E. "A Study of the Factors Which Influence Adult Enrollment in a Technical Institute." EdD Practicum, Nova University, 1983.

Division of Educational Services, Los Angeles Community College. Meeting Technical Education Needs. An Industry-Responsive Model. Los Angeles: Division of Educational Services, 1981.

Drucker, Peter F. Managing in Turbulent Times. New York: Harper and Row, 1980.

Dusewicz, Russell A. Trends in School Improvement: State-Wide Test Results. ERIC ED 274 701, 1987.

Elkins, Robert. A Human Service Manager's Guide to Developing Unit Cost. Falls Church, Virginia: Virginia Institute for Information Studies, 1980.

Fayetteville Observer. July 12, 1987.

Fayetteville Technical Institute Catalog 1986-89, Volume IX. Fayetteville, North Carolina: Fayetteville Technical Institute, 1986.

Fayetteville Technical Institute. General Statues of North Carolina: Chapter 115D: Community Colleges and Technical Institutes. Fayetteville North Carolina: Fayetteville Technical Institute, 1980.

Fayetteville Technical Institute Long Range-Plan 1984-89. Fayetteville, North Carolina: Fayetteville Technical Institute, 1984.

Geroy, Gary D. "Validation of the Training Benefit Forecasting Method: Geometric Dimension and Tolerance Training." Training and Development Research Center: Project Number Two, Minnesota University. Saint Paul, Minnesota: Department of Vocational and Technical Education, 1984.

Gonyea, Meredith A. Present and Future Alternatives for Dental Education: An Advisory Report to the New York State Education Department. Washington, D.C.: The Center for Studies in Health Policy, Inc., 1983.

_____. "Program Analysis and Construction." New Directions for Institutional Research, V,1:65-74. Spring, 1978.

Graham, James W. "The Cost of Dental Hygiene Education." Unpuplished paper presented by Assistant Secretary to the Council on Dental Education, American Dental Association. 1983.

Gramlich, W. E. "Benefit-Cost Analysis of Government Programs." in Department of Economics and Institute of Public Policy Studies, The University of Michigan. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1981.

Gray, P. J., and Smith J. K. Needs Assessment Survey: Cost Analysis Policy Analysis and Other Evaluation Methods. Research on Evaluation Program Paper and Report Series Number 81. Portland, Oregon: North West Regional Education Laboratory, 1983.

Groff, Warren. Presenter at the Nova University Center for Higher Education Summer Institute, Fort Lauderdale, Florida, August, 1986.

Grosse, Robert N. in Cost-Effectiveness Analysis: New Approaches to Decision-Making. Ed. Thomas A. Golman. New York: Praeger Publishers, 1969.

Hatry, H., and others. Program Analysis for State and Local Governments. New York: The Urban Institute, 1976.

Hebbeler, Evangeline L. Dental Education and Supply of Dentists: Policy Issues of the Eighties. ERIC ED 248 746, 1984.

Hirschhorn, Larry, and others. Cutting Back: Retrenchment and Redevolpment in Human and Community Services. San Francisco: Jossey-Bass Publishers, 1983.

Isaac, Stephen and William B. Michael. Handbook in Research and Evaluation, Second ed. San Diego, California: Edits Publishers, 1981.

Jackson, Edward J. "A Comparative Study to Determine the Effectiveness of Adjunct Faculty in the Business Division at Fayetteville Technical Institute." EdD Major Applied Research Project, Nova University, 1986.

McCabe, R. H. Now is the Time to Reform the American Community College. Miami, Florida: Miami-Dade Community College Press, 1981.

Mehallis, Martha. "Responding to Community Needs through Community Follow-Up." Report prepared for the National Institute of Education, Department of Health, Education and Welfare, Washington, D.C., October, 1981.

Murk, Peter J., and Michael W. Galbraith. "Planning Successful Continuing Education Programs: A Systems Approach Model." Life Long Learning, 9(5):21:23, February, 1986.

Navaratnam, K. K., and others. Using Cost-Benefit Analysis to Determine Profitability of Secondary Vocational Programs. ERIC ED 265 384, 1985.

Niskanen, William A. in Cost-Effectiveness Analysis: New Approaches to Decision-Making." Ed. Thomas A. Golman. New York: Praeger Publishers, 1969.

North Carolina Department of Community Colleges. Annual Enrollment Report, 1985-86, Volume 21. Raleigh, North Carolina, Department of Education, 1986.

_____. Management Information Systems. Raleigh, North Carolina, Department of Education, 1987.

Office of Vocational Education, Georgia State Department of Education. "A Comprehensive Needs Assessment for the Program of Vocational Education in Georgia." Report prepared for the Georgia State Department of Education, May, 1983.

Osborn, Frances P. Does Planning Communicate Action? Or Is Your Strategic Plan a Coffee Table Book? ERIC ED 271 174, 1986.

Parker, S. Planning the Education and Training Programs for 1984-85 Against the Background of Past Experience. ERIC ED 262 781, 1982.

"Planning for the 80's: Workforce Educational Development Project Report." Report prepared for Cuyahoga Community College, June, 1981.

Quade, Edward S. in Cost-Effectiveness Analysis: New Approaches to Decision-Making. Ed. Thomas A. Golman. New York: Praeger Publishers, 1969.

Sassone, P. G., and W. A. Schaffer. "Cost-Benefit Analysis and Economic Evaluation of Business Activity." Paper presented at Seminar at Georgia Institute of Technology, Atlanta, Georgia, March, 1977.

Sewell, T. J.A. Study of the Factors Which Precipitate Adult Enrollment in a College Degree Program. Green Bay, Wisconsin: Wisconsin University, 1982.

Shearon, R. W., and others. Putting Learning to Work--A Profile of Technical Institutes, and Technical Colleges. Raleigh, North Carolina: North Carolina Department of Community Colleges, 1980.

Smith, Nick L., and Jona K. Smith. "State-Level Evaluation Uses of Cost Analysis: A National Discriptive Survey." Economic Evaluation of Public Programs: New Directions for Program Evaluation. Ed. James S. Catterall. San Francisco: Jossey-Bass, 1985.

_____. Cost Analysis in Educational Evaluation. Paper and Report Series, No. 100. ERIC ED 257 883, 1984.

Solomon, E. Director, American Dental Association, Washington, D. C. Personal Interview. November, 1986.

Southern Regional Education Board. Annual Enrollment Report. Atlanta, Georgia: Southern Regional Education Association, 1984.

Spenser, Hilton H. Contemporary Economics. New York: Worth Publishers, Inc., 1986.

Statistical Abstract. Washington, D.C.: U. S. Department of Labor, 1987.

Stufflebeam, D. L. "A New Conceptualization of Evaluation Competencies." Paper presented at the annual meeting of the American Educational Research Association, New Orleans, Louisiana, 1973.

Swanson, Richard A. Summative Evaluation in Training and Development: A Review and Critique of Literature, 1980-83. Barbara L. Parker, ed. St. Paul, Minnesota: University of Minnesota, Department of Vocational and Technical Education, 1984.

Third Century Project. North Carolina Memorandum. Z. Smith Reynolds Foundation, October, November, 1986.

Timbers, Robert. Director of Dental Hygiene Department, Fayetteville Technical Institute. Personal Interview Fayetteville, North Carolina, March, 1987.

Vaughan, G. B., and others. Issues for Community College Leaders in a New Era. San Francisco: Jossey-Bass, 1983.

Vinter, Robert D., and Rhea K. Kish. Budgeting for Not-For-Profit Organizations. New York: The Free Press, 1984.

Weathers, Dr. Dean of Dental School, Emory University, Atlanta, Georgia. Personal Interview. November, 1986.

"Where Do We Go From Here? The Use of the Market Analysis Survey in Needs Assessment and Program Development." Report prepared for Hagerstown Junior College, November, 1982.

Wortman, R. M. "Evaluation Research: A Methodological Perspective." Annual Review of Psychology, 34:223-260 1983.

APPENDIX A
Graham's Model
Table 1

Average Total Cost Per Student Per Year
Summary (1983)

PROGRAM	N	DENTAL HYGIENE	BASIC SCIENCE	GENERAL EDUCATION	TOTAL
All Schools - mean	157	$4,907	$571	$391	$5,811
Region					
New England	11	4,070	592	300	4,962
Middle East	28	4,762	596	404	5,740
South East	35	4,441	487	413	5,318
Central	39	4,721	559	405	5,565
South West	14	5,636	803	451	6,858
North West	9	5,410	539	485	6,435
Far West	19	5,669	510	249	6,323
Other	2	8,720	819	375	9,914
Program Setting					
Allied Health	10	3,737	559	360	4,564
Dental School	11	4,809	550	516	5,781
4 Year College	22	5,032	543	368	5,884
Community College	93	4,956	573	376	5,852
Technical College	20	5,133	623	458	6,160
Other	1	5,876	290	458	6,160
Class Size: First Year					
Under 20	21	3,691	552	427	4,649
20-40	80	4,583	527	400	5,455
Over 40	56	5,826	643	364	6,755
Program Length					
Under 65 Weeks	48	4,856	556	348	5,733
65 - 75 Weeks	75	4,756	540	410	5,608
Over 75 Weeks	34	5,312	655	415	6,371

APPENDIX B

Cover Letter

P.O. Box 35236
Fayetteville, NC 28303
(919)323-1961

To: All Local Dentists

Fayetteville Technical Institute is dedicated to serving the employment needs of the health care community in our area. In an effort to be responsive to your anticipated vacancies, we are in the process of evaluating our Dental Hygiene Program.

Please take a few moments to complete the attached survey. Because you may have very specific needs, we invite you to offer your comments and suggestions at the bottom of the survey.

Please return the completed survey in the self-addressed envelope by March, 15, 1987. If you have questions, please contact me at 323-1961, Extension 200.

Sincerely,

Robert Kugelmann

APPENDIX B

DENTAL HYGIENE SURVEY

1. How many dental hygienists do you currently employ?
   ----

2. How many of these have graduated from Fayetteville Technical Institute?----------

3. How many dental hygienists do you anticipate hiring in 1987 due to growth or expansion of your facility?
   ----

4. How many dental hygienists do you anticipate hiring in 1987 due to retirement or separation of current employees? ----------

5. Do you anticipate this need for dental hygienists to continue at approximately the same rate in future years? ----------

6. Given the availability of both, would you prefer hiring an experience dental hygienist or a new graduate?
   ----Experienced ----New Graduate

7. Do you feel that there are sufficient numbers of dental hygienists available?----------

8. Would you expand your operation if more dental hygienists were available?----------

9. Comments: ----------

Thank you for your help. Please return this survey in the enclosed envelope by March 15, 1987.

APPENDIX C
SURVEY OF GRADUATES

Please answer the following questions and return to Placement Office, F.T.I.

1. Curriculum ----------

2. Year of Graduation ----------

3. Are you currently employed? (yes or no)

4. If currently employed, is your employment related to the education which you received at F.T.I.? (yes or no)

5. Are you available to work? (If employed or looking for a job, please answer yes) (yes or no)

6. If you are not available to work, please give reasons.

---

7. Have you, or are you continuing your education? (yes or no)

8. Did you pass the State Board Examination (if applicable)? (yes or no)

9. Are you working in Cumberland County? (yes or no)

10. Are you working outside of Cumberland County? (yes or no)

11. What was your starting salary? ----------

12. Feel free to make any comments you wish concerning your education, and subsequent job status.

APPENDIX D

FAYETTEVILLE TECHNICAL INSTITUTE

SURVEY QUESTIONNAIRE

Please complete this questionnaire according the the instructions given. The findings of this study will help plan courses and services at F.T.I. Your contributions to this study will be greatly appreciated.

Please read each question carefully and circle your answer clearly.

1. SEX: Male Female

2. AGE: 18-21 26-29
22-25 over 30

3. What is your present marital status?

Single/never married

Married

Separated/divorced

Widowed

Read the questions below and choose the five most important reasons from among those given. Circle the number 1 for the most important reason. Circle #2 for the second most important reason. Circle #3, 4, 5, for the third, fourth, and fifth most important reason. Please rank 5 reasons for each question.

4. People enroll in college for many reasons, some of which are listed below: Why did you decide to continue your education? (Rank the five most important reasons by circling the appropriate number as explained above).

a.	to be able to contribute more to society	1 2 3 4 5
b.	to be able to earn more money	1 2 3 4 5
c.	to become more cultured	1 2 3 4 5
d.	to gain a general education	1 2 3 4 5
e.	to get a better job	1 2 3 4 5
f.	to improve my reading and study skills	1 2 3 4 5
g.	to improve my social life	1 2 3 4 5
h.	to learn more things of interest	1 2 3 4 5
i.	to meet interesting people	1 2 3 4 5
j.	my parents or spouse wanted me to go	1 2 3 4 5
k.	there was nothing better to do	1 2 3 4 5

5. Thinking back to when you decided for sure to enroll in college, to what extent did each of the following factors influence your decision to enroll in college. (Circle the five most important reasons and rank them from 1 (most important) to 5 (fifth least important).

a.	Children entered school (kindergarten, college, etc.)	1 2 3 4 5
b.	Dissatisfied with job	1 2 3 4 5
c.	Family or marital problems	1 2 3 4 5
d.	Received enrcouragement from spouse, family, etc.	1 2 3 4 5
e.	Financial aid became available	1 2 3 4 5
f.	Lost job	1 2 3 4 5
g.	Moved to this community	1 2 3 4 5
h.	Obtained specific information about F.T.I. programs	1 2 3 4 5
i.	Serious illness or death in family	1 2 3 4 5
j.	Other, Specify	1 2 3 4 5

6. What five things about Fayetteville Technical Institute influenced you most in deciding to attend? Choose the five most important reasons and rank them as you did in the last question. Rank from 1 (most important) to 5 (least important). Circle five reasons.

a.	Education programs of courses available	1 2 3 4 5
b.	Financial assistance was available	1 2 3 4 5
c.	Job placement services	1 2 3 4 5
d.	Location (nearness to home or work)	1 2 3 4 5
e.	Low cost	1 2 3 4 5
f.	Open-door admissions policy	1 2 3 4 5
g.	Quality of instructions	1 2 3 4 5
h.	Student-centered instruction and activities	1 2 3 4 5
i.	Other reasons	1 2 3 4 5

7. What factors influenced you most in selecting the Dental Hygiene Program at Fayetteville Technical Institute. Again, choose the five most important reasons and rank them from 1 to 5, 1 being most important to 5 being least important.

a.	Secure a degree in the Dental Hygiene Program from FTI	1 2 3 4 5
b.	Obtain credits for transfer to other institution	1 2 3 4 5
c.	A friend encouraged me to become a Dental Hygienist	1 2 3 4 5
d.	Job opportunities in local community	1 2 3 4 5
e.	Job opportunities in other geographical areas	1 2 3 4 5

f. I have already worked in a dentist's office 1 2 3 4 5
g. I do not intend to get a degree 1 2 3 4 5
h. I am taking Dental Hygiene courses only to enhance my professionalism (i.e. continuing ed) 1 2 3 4 5

This concludes the survey. Please check to be sure you ranked 5 choices on questions 4, 5, 6, and 7. Thank you for your assistance.

APPENDIX E
DENTAL HYGIENE GRADUATION REQUIREMENTS

		CLASS HOURS	LAB HOURS	SHOP CLINIC HOURS	QTR.HOURS CREDIT
FIRST QUARTER					
ENG 104	Usage & Composition I	3	0	0	3
DEN 111X	Dental Hygiene I	4	0	0	4
DEN 111Y	Den 111 Lab	0	0	3	1
DEN 112	Dental Anatomy & Physiology	3	0	0	3
BIO 106X	Human Anatomy & Physiology	5	0	0	5
BIO 106Y	BIO 106 Lab	0	0	3	1
BIO 110X	Biological Chemistry for Health Sciences	3	0	0	3
BIO 110Y	BIO 110 Lab	0	0	3	1
		18	0	9	21
SECOND QUARTER					
ENG 105	Usage & Composition II	3	0	0	3
DEN 121X	Dental Hygiene II	3	0	0	3
DEN 121Y	DEN 121 Lab	0	0	6	2
BIO 107X	Human Anatomy & Physiology II	5	0	0	5
BIO 107Y	BIO 107 Lab	0	0	3	1
DEN 133X	Radiography	3	0	0	3
DEN 133Y	DEN 133 Lab	0	0	3	1
DEN 113	Histology & Embryology	3	0	0	3
		17	0	12	21
THIRD QUARTER					
DEN 131X	Dental Hygiene III	2	0	0	2
DEN 131Y	DEN 131 Lab	0	0	9	3
DEN 214	Peridontology	3	0	0	3
BIO 108X	Microbiology	5	0	0	5
BIO 108Y	BIO 108 Lab	0	0	3	1
DEN 122	Head & Neck Anatomy	2	0	0	2
PSY 101	Intro. to Psychology	3	0	0	3
		15	0	12	19
SUMMER QUARTER					
DEN 116	Medical-Dental Emergency Care	2	0	0	2
DEN 141	Dental Hygiene IV	1	0	6	3
NUT 101	Physiological Nutrition	3	0	0	3
ENG 204	Oral Cummunications	3	0	0	3
		9	0	6	11

FOURTH QUARTER					
DEN 211X	Dental Hygiene V	1	0	0	1
DEN 211Y	DEN 211 Lab	0	0	12	4
DEN 213	General & Oral Pathology	6	0	0	6
SOC 101	Intro. to Sociology	3	0	0	3
DEN 215	Dental Health Education	3	0	0	3
DEN 222X	Dental Materials	3	0	0	3
DEN 222Y	DEN 222 Lab	0	0	3	1
		16	0	15	21
FIFTH QUARTER					
DEN 212X	Community Dental Health	3	0	0	3
DEN 212Y	DEN Lab	0	0	3	1
DEN 221	Dental Hygiene VI	1	0	15	6
DEN 223	Pharmacology & Anesthesiology	3	0	0	3
DEN 298	Dental Hygiene Seminar	2	0	0	2
		9	0	18	15
SIXTH QUARTER					
DEN 231X	Dental Hygiene VII	1	0	0	1
DEN 231Y	DEN 231 Lab	0	0	15	5
DEN 232	Ethics & Jurisprudence	2	0	0	2
DEN 233	Dental Specialties	2	0	0	2
DEN 224	Office Management	1	0	0	1
DEN 225X	Chairside Assisting	1	0	0	1
DEN 225Y	DEN 225 Lab	0	0	3	1
	Humanities	3	0	0	3
		10	0	18	16

Total Required Credits 124

APPENDIX F

SURVEY OF GRADUATES

Please fill out and return to Placement Office, F.T.I.

1. Curriculum ----------

2. Age ----------

3. Are you currently employed? (yes or no)

4. If currently employed is your employment related to the education which you received at F.T.I.? (yes or no)

   If "no," why not? ----------

   ----

5. On a scale of 1 to 10, please rate the quality of training you recieved at F.T.I. in your field of work.

   1 2 3 4 5 6 7 8 9 10
   Poor Average Outstanding

6. On a scale of 1 to 10, please rate the adequacy of equipment involved in any shop or lab.

   1 2 3 4 5 6 7 8 9 10
   Poor Average Outstanding

7. On a scale of 1 to 10, please rate the equipment relative to being up-to-date with comparable equipment on the job.

   1 2 3 4 5 6 7 8 9 10
   Poor Average Outstanding

8. How would you rate the availability of jobs in the Cumberland County area related to your major at F.T.I.? Please check one:

   ----almost impossible to find
   ----requires a lot of looking, but jobs are available
   ----easy to find

9. How would you rate the availablity of jobs in North Carolina related to your major at F.T.I.? Please check one:

   ----almost impossible to find
   ----requires a lot of looking, but jobs are available
   ----easy to find

10. On a scale of 1 to 10, please rate the following F.T.I. facilities:

1 2 3 4 5 6 7 8 9 10
Poor Average Outstanding

----Library ----Bookstore
----Learning Lab ----Cafeteria
----Student Lounge ----Parking

11. Using the same scale as number 7, please rate:
----General classrooms
----Shop/Lab facilities

12. What can F.T.I. do to help you with future educational needs?

---

13. On a scale of 1 to 10, please rate each item below based on your level of satisfaction:

1 2 3 4 5 6 7 8 9 10
Poor Average Outstanding

a. ----course content in your major area of study
b. ----quality of instruction in your major area of study
c. ----class size relative to the type of course
d. ----flexibility to design your own program of study
e. ----value of the information provided by your advisor
f. ----challenge offered by your program of study
g. ----preparation you received for your chosen field
h. ----assistance provided by Student Development staff when you entered F.T.I.
i. ----general condition and appearance of the buildings and grounds
j. ----availability of the courses you wanted at times you could take them
k. ----attitude of F.T.I.'s non-teaching staff toward students

14. Are there any other services you feel F.T.I. should offer students?

---

15. Would you recommend F.T.I. to others?
----yes ----no

If no, please explain why. ---

APPENDIX G

A.	CURRICULUM DESCRIPTION		
	1. Program Setting	Community College	
	2. Academic Structure		
	a. Term	Quarter	
	b. Session Length	11 weeks	
	c. Summer Session	yes	
	d. Length of Program	two years	
	e. Enrollment		
	First Year	24	
	Second Year	18	
	Total	42	
	f. Attrition	8	
	g. Graduates	22	
	h. Scheduled Class Hours/Week	29	
B.	FACULTY PROFILE	TEACHING RESPONSIBILITY UNIT (TRU) Dental Hygiene	
	1. Availability for Teaching		
	a. Hours Per Week	23	
	b. Average Weeks Per Year	44	
	2. Average Salary		
	a. Actual	24,813	
	b. Adjusted	28,748	
C.	COST FACTORS		
	1. Faculty Cost		
	a. Actual	124,064	
	b. Adjusted	143,742	
	c. Percent of Total	77.14	
	2. Other Costs		
	a. Actual	36,758	
	b. Adjusted	42,588	
	c. Percent of Total	22.86	
D.	STUDENT CONTACT HOURS	1562	

Figure 4

Cost Construction for the Fayetteville Technical Institute Dental Hygiene Program 1982

TEACHING RESPONSIBILITY UNIT (TRU)	DENTAL HYGIENE
Student Contact Hours	1562
Number of Students	42
Graduates	22
Faculty Contact Hours	23
Faculty Available for FTE	5
FTE Faculty Required	5

	Actual Costs	Adjusted Costs
Average Faculty Salary	24,813	28,748
Faculty Costs	124,064	143,742
Other Cost Factor	22.86	
Other Costs	36,758	42,588
Total Cost FC & OC	160,822	186,330

CONSTRUCTION OF STUDENT COSTS FOR DENTAL HYGIENE PROGRAM

1.	Total Students	42
2.	Cost Per Student Year	(actual) $3,829
		(adjusted) $4,436
3.	Cost Per Student Output	(actual) $6,047
		(adjusted) $7,006

Figure 5

Program Cost Comparison for the 1982 Fayetteville Technical Institute Dental Hygiene Program

A.	CURRICULUM DESCRIPTION	
	1. Program Setting	Community College
	2. Academic Structure	
	a. Term	Quarter
	b. Session Length	11 weeks
	c. Summer Session	yes
	d. Length of Program	two years
	e. Enrollment	
	First Year	20
	Second Year	13
	Total	33
	f. Attrition	6
	g. Graduates	18
	h. Scheduled Class Hours/Week	29

		TEACHING RESPONSIBILITY UNIT (TRU) Dental Hygiene
B.	FACULTY PROFILE	
	1. Availability for Teaching	
	a. Hours Per Week	23
	b. Average Weeks Per Year	44
	2. Average Salary	
	a. Actual	25,885
	b. Adjusted	29,060
C.	COST FACTORS	
	1. Faculty Cost	
	a. Actual	129,424
	b. Adjusted	145,064
	c. Percent of Total	81.4
	2. Other Costs	
	a. Actual	29,567
	b. Adjusted	33,195
	c. Percent of Total	18.6
D.	STUDENT CONTACT HOURS	1562

Figure 6

Cost Construction for the Fayetteville Technical Institute Dental Hygiene Program 1982

TEACHING RESPONSIBILITY UNIT (TRU)	DENTAL HYGIENE
Student Contact Hours	1562
Number of Students	33
Graduates	18
Faculty Contact Hours	23
Faculty Available for FTE	5
FTE Faculty Required	5

	Actual Costs	Adjusted Costs
Average Faculty Salary	25,885	29,060
Faculty Costs	129,424	145,302
Other Cost Factor	18.6	
Other Costs	29,567	33,195
Total Cost FC & OC	159,991	178,497

CONSTRUCTION OF STUDENT COSTS FOR DENTAL HYGIENE PROGRAM

1.	Total Students	33
2.	Cost Per Student Year	(actual) $4,818
		(adjusted) $5,409
3.	Cost Per Student Output	(actual) $6,457
		(adjusted) $7,249

Figure 7

Program Cost Comparison for the 1983 Fayetteville Technical Institute Dental Hygiene Program

A.	CURRICULUM DESCRIPTION		
	1. Program Setting	Community College	
	2. Academic Structure		
	a. Term	Quarter	
	b. Session Length	11 weeks	
	c. Summer Session	yes	
	d. Length of Program	two years	
	e. Enrollment		
	First Year	17	
	Second Year	13	
	Total	30	
	f. Attrition	7	
	g. Graduates	13	
	h. Scheduled Class Hours/Week	29	
B.	FACULTY PROFILE	TEACHING RESPONSIBILITY UNIT (TRU) Dental Hygiene	
	1. Availability for Teaching		
	a. Hours Per Week	23	
	b. Average Weeks Per Year	44	
	2. Average Salary		
	a. Actual	29,066	
	b. Adjusted	31,287	
C.	COST FACTORS		
	1. Faculty Cost		
	a. Actual	116,265	
	b. Adjusted	125,148	
	c. Percent of Total	71.03	
	2. Other Costs		
	a. Actual	47,425	
	b. Adjusted	51,048	
	c. Percent of Total	28.97	
D.	STUDENT CONTACT HOURS	1430	

Figure 8

Cost Construction for the Fayetteville Technical Institute Dental Hygiene Program 1984

TEACHING RESPONSIBILITY UNIT (TRU)	DENTAL HYGIENE
Student Contact Hours	1430
Number of Students	30
Graduates	13
Faculty Contact Hours	23
Faculty Available for FTE	4
FTE Faculty Required	4

	Actual Costs	Adjusted Costs
Average Faculty Salary	29,066	31,287
Faculty Costs	116,265	125,148
Other Cost Factor	28.97	
Other Costs	47,425	51,048
Total Cost FC & OC	163,690	171,196

CONSTRUCTION OF STUDENT COSTS FOR DENTAL HYGIENE PROGRAM

1.	Total Students	30
2.	Cost Per Student Year	(actual) $5,456
		(adjusted) $5,873
3.	Cost Per Student Output	(actual) $7,182
		(adjusted) $7,731

Figure 9

Program Cost Comparison for the 1984 Fayetteville Technical Institute Dental Hygiene Program

A.	CURRICULUM DESCRIPTION	
	1. Program Setting	Community College
	2. Academic Structure	
	a. Term	Quarter
	b. Session Length	11 weeks
	c. Summer Session	yes
	d. Length of Program	two years
	e. Enrollment	
	First Year	16
	Second Year	13
	Total	28
	f. Attrition	4
	g. Graduates	13
	h. Scheduled Class Hours/Week	29

		TEACHING RESPONSIBILITY UNIT (TRU) Dental Hygiene
B.	FACULTY PROFILE	
	1. Availability for Teaching	
	a. Hours Per Week	23
	b. Average Weeks Per Year	44
	2. Average Salary	
	a. Actual	32,267
	b. Adjusted	33,526
C.	COST FACTORS	
	1. Faculty Cost	
	a. Actual	129,069
	b. Adjusted	134,102
	c. Percent of Total	77.98
	2. Other Costs	
	a. Actual	36,450
	b. Adjusted	37,871
	c. Percent of Total	22.02
D.	STUDENT CONTACT HOURS	1430

Figure 10

Cost Construction for the Fayetteville Technical Institute Dental Hygiene Program 1985

TEACHING RESPONSIBILITY UNIT (TRU)	DENTAL HYGIENE
Student Contact Hours	1430
Number of Students	28
Graduates	13
Faculty Contact Hours	23
Faculty Available for FTE	4
FTE Faculty Required	4

	Actual Costs	Adjusted Costs
Average Faculty Salary	32,267	33,526
Faculty Costs	129,069	134,102
Other Cost Factor	22.02	
Other Costs	36,450	37,871
Total Cost FC & OC	165,519	171,973

CONSTRUCTION OF STUDENT COSTS FOR DENTAL HYGIENE PROGRAM

1. Total Students 28
2. Cost Per Student Year (actual) $5,911
   (adjusted) $6,142
3. Cost Per Student Output (actual) $8,200
   (adjusted) $8,520

Figure 11

Program Cost Comparison for the 1985 Fayetteville Technical Institute Dental Hygiene Program

A.	CURRICULUM DESCRIPTION	
	1. Program Setting	Community College
	2. Academic Structure	
	a. Term	Quarter
	b. Session Length	11 weeks
	c. Summer Session	yes
	d. Length of Program	two years
	e. Enrollment	
	First Year	31
	Second Year	8
	Total	39
	f. Attrition	4
	g. Graduates	12
	h. Scheduled Class Hours/Week	29

		TEACHING RESPONSIBILITY UNIT (TRU) Dental Hygiene
B.	FACULTY PROFILE	
	1. Availability for Teaching	
	a. Hours Per Week	23
	b. Average Weeks Per Year	44
	2. Average Salary	
	a. Actual	34,915
	b. Adjusted	34,915
C.	COST FACTORS	
	1. Faculty Cost	
	a. Actual	139,660
	b. Adjusted	139,660
	c. Percent of Total	77.19
	2. Other Costs	
	a. Actual	40,499
	b. Adjusted	40,499
	c. Percent of Total	22.48
D.	STUDENT CONTACT HOURS	1430

Figure 12

Cost Construction for the Fayetteville Technical Institute Dental Hygiene Program 1986

TEACHING RESPONSIBILITY UNIT (TRU)	DENTAL HYGIENE
Student Contact Hours	1430
Number of Students	39
Graduates	12
Faculty Contact Hours	23
Faculty Available for FTE	4
FTE Faculty Required	4

Actual Costs

Average Faculty Salary	34,915
Faculty Costs	139,660
Other Cost Factor	22.48
Other Costs	40,499
Total Cost FC & OC	180,159

CONSTRUCTION OF STUDENT COSTS FOR DENTAL HYGIENE PROGRAM

1.	Total Students	39
2.	Cost Per Student Year	(actual) $4,619
3.	Cost Per Student Output	(actual) $7,332

Figure 13

Program Cost Comparison for the 1986 Fayetteville Technical Institute Dental Hygiene Program

ERIC CLEARINGHOUSE FOR JUNIOR COLLEGES JUL 15 1988